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The Reclaiming of Waste Foundry Sand

What Experiments at Detroit Have Shown with Regard to the Possibilities of Utilizing Material Looked Upon as Refuse

A year or two ago the railroads advanced the rate of outgoing foundry refuse from the Detroit district, and this made it desirable for the foundrymen to find a method of using as much of the old sand as possible. Experiments had already been run in different parts of the country using different types of machinery. They had been more or less successful but the experiments had also proved that the local conditions governed the practice to a larger extent than generally understood.

A co-operative arrangement was finally made in accordance with which a number of manufacturers of equipment loaned the necessary machinery and a group of foundrymen were to defray the expenses of the tests. An experimental plant was put in in connection with the laboratory of the H. M. Lane Company, Detroit, as this laboratory was centrally located, both for work in the city of Detroit and for rail shipments. The following are some of the firms that supplied apparatus: Standard Sand & Machine Company, Cleveland, supplied a paddle type batch mixer, a hammer crusher for crushing old cores, a roll blending machine for re-bonding sand and a centrifugal mill for disintegrating sand; the Knickerbocker Company, Jackson, Mich., loaned a dust arrester; the American Blower Company, a blower; the Wadsworth Core Machine & Equipment Company, Akron, Ohio, two pan type roller mills (one was a small experimental mill and the other a three-foot mill); the Osborn Mfg. Company, Cleveland, supplied one of the Osborn washing barrels; Dorr Cyanide Machinery Company, New York City, furnished a Dorr washer. Later some slight changes were made in this during the progress of the tests to adapt it to the work. Considerable material was gotten out under the supervision of H. M. Lane, which included a hydraulic classifier, a dry cleaning machine and a system of elevators, chutes, spouts, etc., for handling the material.

The general arrangement of the plant and some of the equipment is indicated in the accompanying illustrations. Fig. 1 shows the base of the elevator tower and the bottom section of the dry cleaner. This was also arranged to act as a dryer for removing a small percentage of moisture from the sand, to fit the material for dry cleaning. The elevator boot shown at the left received material for delivery to any one of the machines, the flow of the material being controlled by pipes and chutes extending from the top of the tower, which was something over 40 ft. high. On some of the tests a special riddle was fitted up for feeding the material directly into the boot of the elevator.

Fig. 1—Boot of Elevator for Handling Sand to Machines, Together with Base of Dry Cleaning Tower

Fig. 2 shows a bin in the second story of the main laboratory arranged to receive sand from the elevator. At the right of this is the Osborn washing barrel with a series of pipes leading to settling tanks in the sand cleaning building proper.

Fig. 3 is a general view of the sand cleaning room. In the center is the Dorr washer. Beyond the Dorr washer may be seen the blower which served as an exhauster for the dry cleaner. Over the Dorr machine can be seen the cone at the bottom of the dust separator which was used for removing the dust from the air exhausted from the dry cleaner. The dust flowed from the trap through an inclined pipe and was either caught in wheel-barrows or allowed to accumulate on the floor. At the left can be seen some of the parts of the hydraulic classifier and some of the settling tanks. Fig. 4 shows the centrifugal core crusher and the roll blending machine supplied by the Standard Sand & Machine Company.

Sand was tested for the following firms: American Blower Company, Michigan Steel Castings Company, Detroit Steel Castings Company, Monarch Steel Castings Company, Aluminum Castings Company, Packard Motor Car Company, Michigan Malleable Iron Company, American Car & Foundry Company, Russel Wheel & Foundry Company, Ford Motor Company, Detroit Foundry Company, Fairview Foundry Company, and the Cadillac Motor Car Company, all of Detroit, the Michigan Motor Castings Company, Flint, Mich., Central Foundry Company, Holt, Ala., and the Pressed Steel Car Company, Pittsburgh. A number of other firms have shown an interest in the tests.

The results of the tests may be stated briefly as follows: The use that can be made of foundry sand depends upon the character of the original sand used, the character of the binder used and the style of work that is being turned out. In steel castings plants where silica sand is employed, a good recovery can be had by either the wet or dry process. However, with sand from some foundries, the practice had to be varied slightly in accordance with the condition in which the sand left the casting cleaning floor.

The dry cleaning process takes less plant installation, but more power for its operation. The cost per ton, however, will be less in the wet process, as far as the cleaning is concerned, but where the sand has to be used again at once it is necessary to install drying machinery, which increases the cost per ton and thus of operation to such an extent that in most cases there is very little choice either as to original cost or cost of operation between the wet and dry processes. The governing features are local conditions, the character of the sand as it leaves the foundry and, to some extent, the character of the original silica sand used.

The universal opinion expressed by all the steel foundries for whom testing has been done is that the wet cleaned sand is fully as good as new silica sand and that for some work the dry cleaned sand is almost as good as new silica sand.

As regards the gray iron foundry, an entirely different set of conditions is found. Where a very coarse gravel or sand is employed in making large cores with pitch compound or flour, the dry cleaning process removes sufficient of the fine material from the sand and returns a product which is just as efficient in making cores as the original bank sand. This is also true where glutrin is used as a core binder, provided some clay wash or molding sand be used in the mix.

For oil sand cores made from fine sand, in cases where no seacoal or coke dust is used, a number of gray iron foundries have reported excellent results with wet cleaned sand and some have had good results from the dry cleaned sand, the conditions depending more or less on the character of the original sand. For pitch compound cores or dextrin cores for automobile work, the dry cleaning process gives excellent results.

Where very fine sands are employed, neither the dry or wet process removes the carbon sufficiently to give a high binding ratio for oil sand cores. For brass or aluminum work with rosin, dextrin or flour as a binder, the dry cleaning process returns an excellent product.

In all of the experiments the sand coming from the gangway and cleaning room was, as a general rule, put through the machine together regardless of whether it was molding or core sand.

A number of experiments were run in which the cleaned sand was made into molding sand.

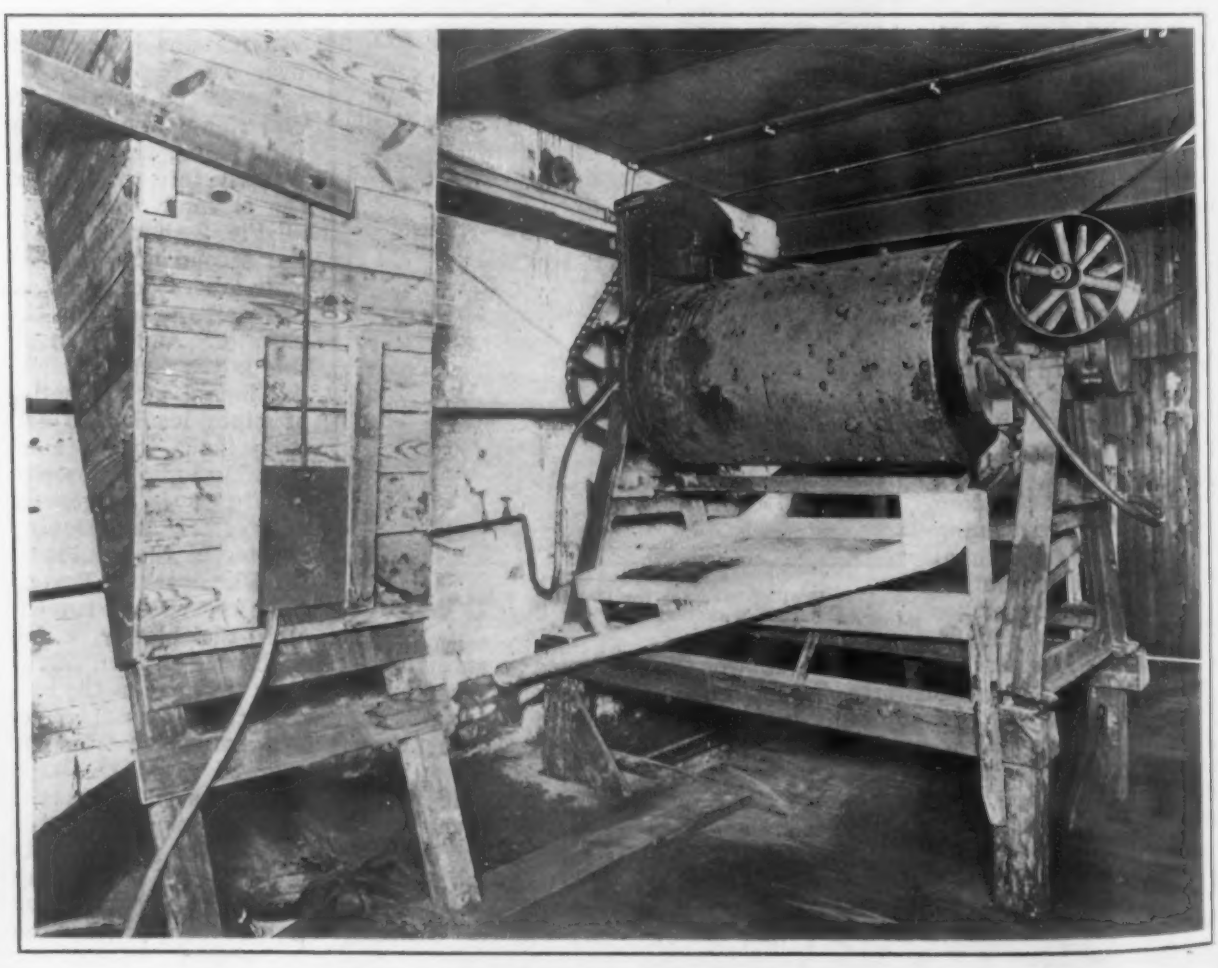


Fig. 2—Osborn Washing Barrel for Washing Core Sand

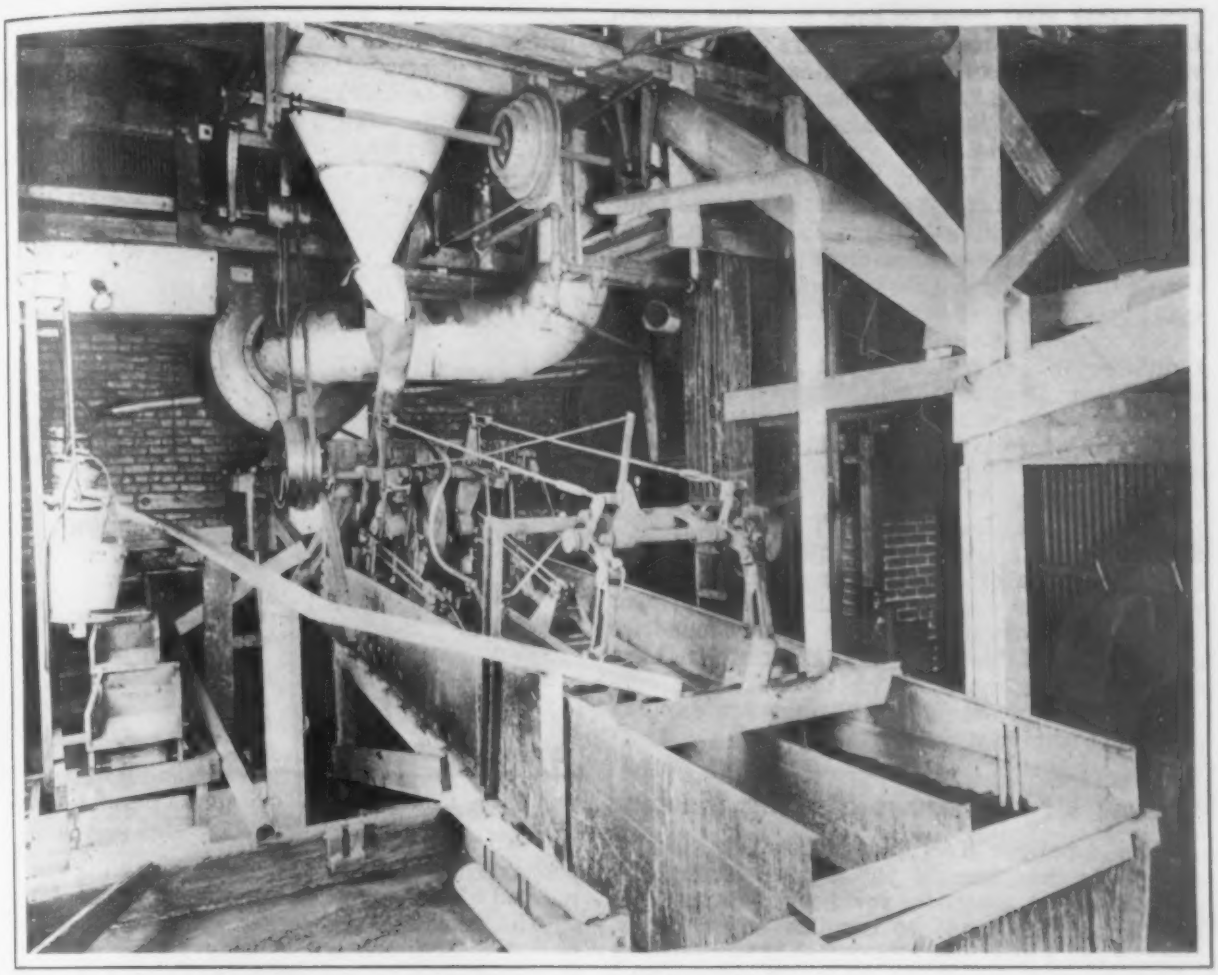


Fig. 3—Dorr Classifier for Wet Cleaning Sand, Together with Exhaust Fan and Dust Trap for Dry Process

For foundries where a rather fine grade of core sand is used, all of the material from the cleaning room and gangways was dry cleaned and then re-bonded with clay, the bond being rolled into the material with a roll blending machine. In the first experiment considerable difficulty was encountered in getting a suitable clay, but a good many samples were made which gave excellent results on the sand heap, and it is undoubtedly true that in the case of many foundries the waste product can be utilized to better advantage as molding sand than in any other way. This also opens up a possibility of making a mixture of cleaned sand and local bank sand bonded with clay for use as a molding sand.

The apparatus for either the dry or wet process of cleaning is not very expensive. For most classes of work it has been found possible to design a simple machine for crushing up old cores and re-using the material which they contain. The credit side of an account is composed of two items, first, the cost of new sand, and second, the expense involved in disposing of old sand. In the majority of cases sand can be cleaned for less than it can be taken away from the plant and delivered to the dump, and this means that the sand is cleaned for nothing or for a very few cents per ton and is just as efficient as newly purchased sand. In fact, the cleaning of the sand removes the pebbles which have been reduced to dust owing to exposure to heat.

The tests indicate that each plant will have to be designed to fit the special foundry requirements encountered in the different plants, but that once these conditions have been taken into consideration, good returns can be expected from sand cleaning. There are a few types of cores the sand from which is not worth cleaning. In some parts of the country 50 to 75 per cent of the material used is limestone pebbles. This material cannot be cleaned satisfactorily and it is probable that

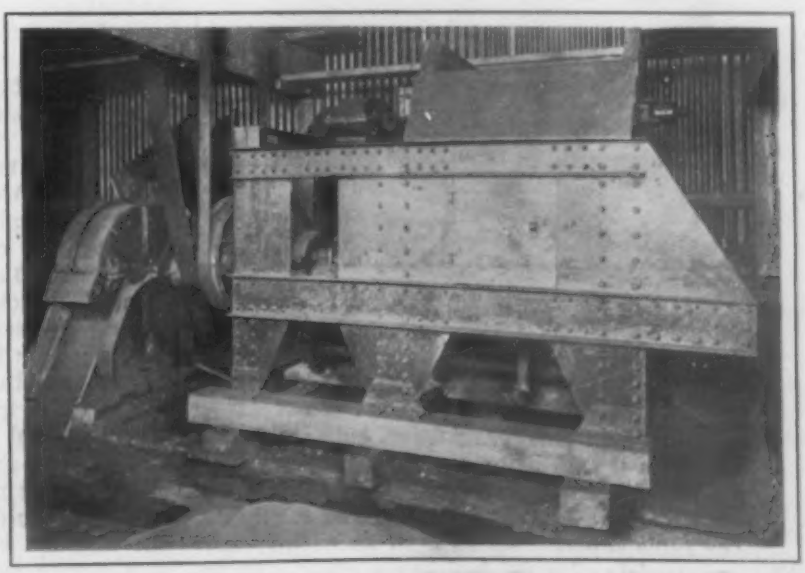


Fig. 4—Core Crushing Machine and Roll Blending Machine for Using Old Products

S. DIESCHER & SONS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

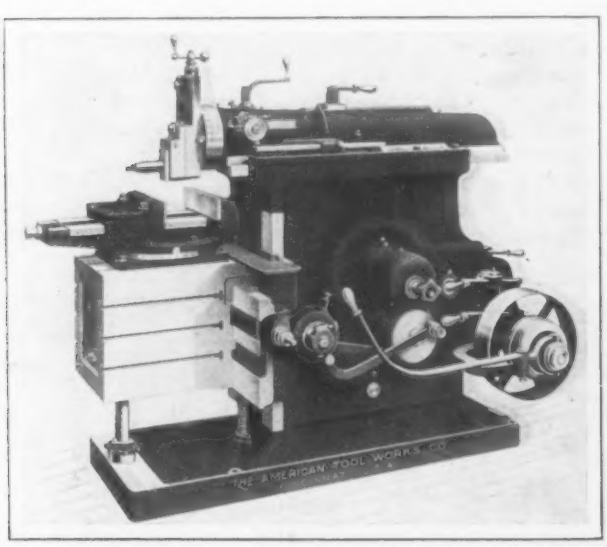
some other local types of sand may give trouble. In a plant where oil sand cores are being made it will frequently be found advantageous to subject local bank sand to washing so as to remove the loam and reduce the percentage of oil necessary to make good cores.

The magnitude of the waste sand problem in the United States is not appreciated by most foundrymen nor is the advantage in conserving the core and molding sand resources. Such plants as the Commonwealth Steel Company and the American Steel Foundrles at Granite City, Ill., Mr. Lane mentions, ship out as much as 200 tons of waste foundry sand per day when the plant is running full. When the foundries in Detroit are operating at the maximum capacity there are some 65 cars of outgoing refuse daily. Of this material, 80 to 92 per cent can usually be recovered and returned to the foundryman in a condition in which it is just as efficient as new sand. This means that a foundry would not have to maintain as many bins for the storage of their winter supply and they would not be as dependant as they are at present upon shipping conditions. Scarcely any foundries are too small to consider the problem, Mr. Lane emphasizes, and no plant which does much core work and melts over 12 or 15 tons per day can afford not to give it consideration.

A New Heavy Service Shaping Machine

The American Tool Works Company, Cincinnati, Ohio, has brought out a new shaping machine designed especially for heavy service. An effort has been made to combine ample power, rigidity and a wide range or cutting speeds. Among the features are an improved design of ram and rocker arm, a new type automatic and variable cross feed and a new speed box.

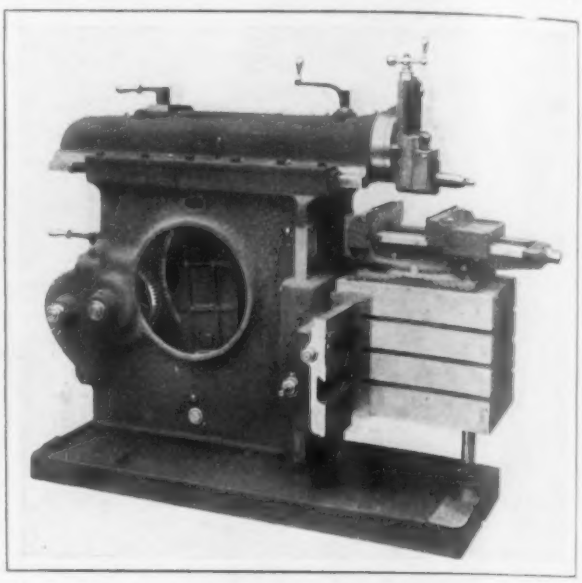
The column is deep and wide, with internal bracing and tapers slightly toward the top. A wide deep rib cast integral with the wall provides reinforcing on the outside, and the top of the column pojects both front and rear, to give a long bearing for the ram.



A Recently Designed Shaping Machine Intended for Heavy Service

The base is of pan construction, both inside and out, to catch the oil drippings, thus protecting the floor and foundation, and means are provided for draining off the oil which is collected on the inside.

The table support, which is of an entirely new design, consists of a notched bar supplied with an adjustable nut at the bottom, and is operated throughout the full traverse of the rail. The notches are spaced 1 in. apart and are engaged by a spring plunger after the rail has been adjusted, any further adjustment being accomplished through the nut at the bottom of the notched bar, which bears on the planed surface of the base. In this way, it is pointed out, a rigid and positive support is secured, and at the same time the rail is relieved of the weight of the table and the work.



Rear of the Machine with the Cover Plate Removed to Show Ram Driving Mechanism

The ram and the rocker arm are of an improved design, the latter being rigidly connected to a pivot shaft at the bottom of the column which supports all the weight of the arm and the other parts. The connection between the rocker arm and the ram is by a double link, which is arranged to pull down on the ram during the cutting stroke, thus tending to neutralize the upward thrust of the tool. The rocker arm is a complete U-section for its entire length, and is reinforced by heavy transverse and cross ribs. The ram is heavy and is reinforced by internal ribs. The length of stroke can be changed at will, without stopping the machine, as the device for positioning the stroke is located on the ram near the head and can be operated while the machine is running.

The speed box is a complete unit which can be easily interchanged with cone pulley drive units, so that a cone pulley driven machine can be changed over to a speed box drive after shipment and vice versa. Four speed changes are provided, and these are doubled by the back gear drive, so that a total range of from 6.5 to 90 strokes per min. is provided. The changes are accomplished while the machine is running by seven heat-treated steel gears and two operating levers, which are conveniently located.

The head can be operated at any angle within an arc of 100 deg., and can be easily locked in position. The down slide has a continuous taper gib having end screw adjustment for taking up wear. The down feed is of unusual length, and the screw has an adjustable graduated collar reading to 0.001 in. A large tool post is supplied for using holders with inserted bits. The cross feed is automatic and variable and has 32 changes from 0.006 in. per stroke of the ram upward. A conveniently located knurled knob enables the feed to be changed while the machine is running. A fiber adjustable friction serves as a safety device between the feed mechanism and the cross-feed screw.

New Floor Type of Grinding Wheel Stand

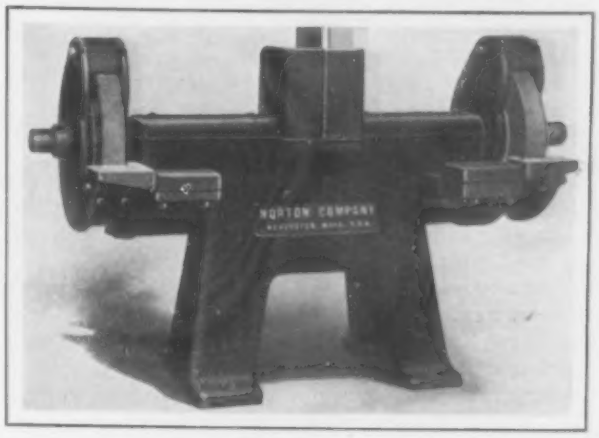
The Norton Company, Worcester, Mass., has brought out a new design of floor type of grinding wheel stand, equipped with special protection and dust hoods. It represents a product of the company's experience in the use of its grinding wheels on many types of floor stands now on the market, and the designer has apparently endeavored to incorporate into it every feature that will help to obtain greater production and give longer life to the wheels and the machine itself. Particular attention has been paid to its general appearance, as indicated by its freedom from sharp corners, recesses and uncovered bolts and to provision against too frequent replacements by increasing the weight and providing large sized spindles and chilled work rests.

Although the foundation space occupied by the machine is small, it is emphasized that its weight and rigidity permit of overhang of the bearing bed, which gives the operator footroom. The portion of the spindle outside the bearings has been made long enough to take taper wheels, having a taper of ½ to ¾ in. per ft., which have the same face width as the maximum width of straight wheels. The inside flanges are fitted loosely on the spindle and are driven by a key, which it is pointed out makes removal a simple matter. Taper flanges can also be used on these machines if the hole is of the proper size, by cutting a spline in the hole of the inside flange to fit the square key in the spindle.

The underside of the overhanging bearing bed has a machined seat and T-slots, in which bolts are placed to secure work rest brackets, protection hoods and surface grinding attachments. All of the attachments are independent and interchangeable and may be attached or removed quickly. Where large work has to be ground, and it is necessary to remove the work rest, the work rest bracket can also be taken away. The upper surface of the work rest is chilled, which is relied upon to give longer life and has been increased in size to give support for large and heavy work. A belt guard, which enables any angle from the vertical from 45 deg. to be secured, extends 2 in. above the top line of the maximum size of wheels. In addition to affording protection to the operator, this also guards the belt when long pieces are being ground on the surface grinding attachment.

A specially designed protection and dust hood is provided, which is relied upon to guard not only against injury in case of accident to the wheel but also, when the hood is connected with some suitable dust removal system, against injury to the health. The closed hood consists essentially of a heavy band of boiler plate and two heads or side plates which surround about five-sixths of the wheel, leaving a 60-deg. opening. A heavy steel slide which provides adjustment for wheel wear travels in grooves which are eccentric to the spindle center. This type of hood covers the end of the spindle, thus preventing an accident due to clothing becoming caught in the thread of the spindle while through the employment of a special lock nut the outer head or side plate is easily removed to permit the wheels being changed.

In addition to this type of hood, the company is also placing on the market one adaptable to any make of floor stand conforming to the general contour of the Norton stands. The hood is adjustable about the wheel, permitting the grinding to be done on top, at the front or at the bottom of the wheel, it being necessary for the purchaser to provide a bracket, to which the inner head holding the entire structure may be attached. Both of these heads are arranged for connection to a dust exhaust pipe. In the hood which is supplied with the machine the bracket supporting the hood serves also as a dust exhaust pipe, while in the other hood the bracket is solid, as is also the inner head, and the exhaust pipe is located on the boiler plate band.



A Recently Developed Grinding Wheel Stand of the Floor Type Equipped with a New Design of Protective Hood

The exhaust pipe is mounted on a steel plate of the same radius as the band and is firmly bolted to it, the opening being cut at any desired point.

Programme of Supply and Machinery Dealers

The programme for the ninth annual convention of the National Supply and Machinery Dealers' Association, which meets in conjunction with the American Supply and Machinery Manufacturers' Association at White Sulphur Springs, W. Va., June 15, 16 and 17, is briefly as follows:

Monday, June 15, 10.30 a. m.—Open session. Annual address of President Charles S. Farquhar, Chandler & Farquhar Company, Boston, Mass.; reports of Secretary-Treasurer Thomas A. Fernley and of the executive committee.

Monday, 2.30 p. m.—Joint session with the American Supply and Machinery Manufacturers' Association; addresses by well known speakers on topics of national importance to dealers and manufacturers.

Tuesday, June 16, 10 a. m.—Executive session. Report of the treasurer and of the committee on the cost of distributing mill supplies and discussions on cash discounts, association work, direct shipments, stock and cost records, standardization of records and other subjects of interest to machinery dealers.

Wednesday, June 17, 10.30 a. m.—Executive session. New business, election and installation of officers, expressions of preference regarding place of next convention, final adjournment of business sessions.

On Tuesday afternoon there will be no session of either body, which will allow time for private conferences on matters of individual business concern. Entertainment features have been arranged for each evening and Wednesday afternoon.

The National Association of Corporation Schools will hold its second convention in Philadelphia, June 9, 10, 11 and 12. The association was organized in New York, January 24, 1913, "to aid corporations in the education of their employees, (1) by providing a forum for the interchange of ideas and (2) by collecting, and making available, data as to successful and unsuccessful plans in educating employees." Arthur Williams, New York Edison Company, is president. The membership approaches 150 in all classes, covering 32 different industries.

The W. M. Pattison Supply Company, Cleveland, Ohio, dealer in machinery and supplies, has increased its capital stock from $150,000 to $500,000. The company plans to erect a new storeroom and warehouse on Rockwell avenue near East Sixth street.

Heat Treatment in the Steel Wire Industry*

What It Contributes to the Production of High Grade Materials—Details of the Advanced Practice the Laboratory Has Given

BY JOHN F. TINSLEY†

The use in the wire industry of heat treatments in the broad definition of the term is very old. In fact, the development of the wire business has been due primarily to an early appreciation and application of such fundamental heat treatment processes as annealing, hardening and tempering.

In the manufacture of wire, heat treatments take not merely an important position but an indispensable one, with a scope of application far broader perhaps than in any other branch of the steel industry. This is, of course, to be expected, not only because of the multiplicity of uses under the most exacting requirements of service to which the enormous tonnage of wire is put, and not only because of the extremely small individual parts manufactured from wire, but also because of the extraordinary amount of work required in reducing steel from the ingot, in which it is orignally cast, to the comparatively small section of the finished wire. A better appreciation of the latter fact may be had when it is realized that a 2-ton ingot, when rolled and drawn into the average size telegraph wire, becomes elongated upward of 20,000 times its original length.

The principal heat treatments used in the manufacture of wire are: 1, annealing; 2, patenting; 3, hardening and tempering. The object of this paper is to present a discussion of the practical application of these basic heat-treatment processes, which affect by far the largest tonnages in the manufacture of steel wire.

THE FUNCTIONS OF ANNEALING

In discussing heat treatments of steel wire, that of annealing naturally comes first, because it is the most common of all heat treatments applied to wire, being practically the only heat treatment to which the enormous tonnage of soft or low carbon steel wires is subjected.

Annealing serves to accomplish three important functions: 1. To remove the effects of hardening due to cold work in wire drawing or cold rolling, thus making the steel ductile and soft. Annealing for this purpose covers principally the low carbon wires, those with carbon 0.25 per cent. and under. 2. To refine grain—applied principally to the higher carbon rods and wires, those with carbon 0.30 per cent. and over. 3. To obtain definite structure in the finished material—applied principally to the higher carbon wires, those with carbon 0.30 per cent. and over.

REMOVING THE EFFECTS OF COLD WORK

The first class of annealing to be described covers low carbon steel which, under the microscope, shows a structure consisting chiefly of a mass of grains of iron interspersed with dark patches. These dark patches contain practically all of the carbon of the steel in the form of iron carbide. Fig. 1 shows a photomicrograph of a small section of a specimen of an 0.08 per cent. carbon steel with a magnification of 100.

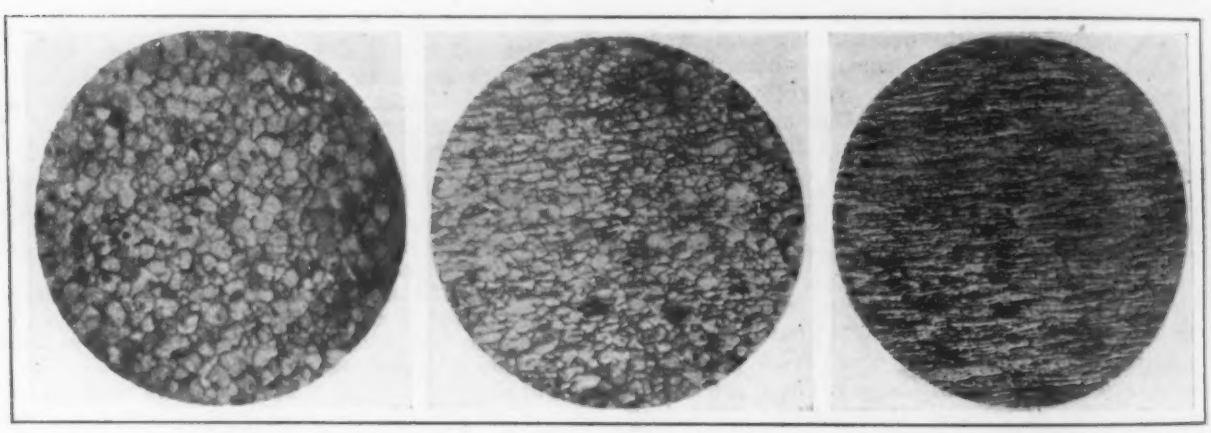


Fig. 1—Annealed (0.08 carbon) steel

Fig. 2—Steel wire (0.08 carbon) given one draft; 15 per cent. reduction from rod

Fig. 3—Steel wire (0.08 carbon) given several drafts; 60 per cent. reduction from rod

The Effect of Wire Drawing.—When a steel wire rod of the structure shown in this photomicrograph is subjected to the wire drawing process, a marked change in the grain structure takes place. With each successive draft, the grains stretch out in the direction of drafting until a point is reached when the grains have been elongated to the limit of their ductility. If subjected to further strain by further drafting they will part and the wire will break. Before this brittle condition is reached, therefore, it is necessary to heat treat the wire by subjecting it to what is known in the wire business as a "process annealing."

The effect of wire drawing in elongating the structural grain of the steel may be seen by comparing Figs. 1, 2 and 3. Fig. 1 shows the structure of the rod before drawing; Fig. 2 shows the structure after a 15 per cent. reduction from the rod; and Fig. 3, the structure after a 60 per cent. reduction from the rod. All of these micrographs represent sections taken from a plane parallel to the axis of the rod or wire, not cross sections. The reason for the marked difference in grain shown in Figs. 1 and 3 may be grasped more clearly when it is appreciated that Fig. 3 represents a wire reduced in

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the wire drawing process to such a degree that it has become elongated 2⅓ times the original length of the rod.

The Effect of Process Annealing.—Process or "Works" annealing consists in heating the wire to a certain temperature, maintaining such temperature until the entire mass of steel is thoroughly heated through, and finally cooling down. Practically all prominent authorities on the metallurgy of steel state that the temperature of annealing must be above the critical temperature, which briefly defined is that range of temperature above which the iron and iron carbide are mutually in solid solution. Few of our authorities, however, seem to recognize the fact that in the most common of all annealing of steel wire—that to remove the effects of cold work such as drawing—it is not necessary to reach the critical temperature, which is 1300 deg. F., or higher, depending on the carbon content. A temperature of 1100 deg. F. is entirely sufficient to relieve the strained condition of the grain shown in Fig. 3. Fig. 4 shows the same wire that is depicted in Fig. 3 after annealing at a temperature below the critical range.

In the annealing process the strained and elongated grains shown in Fig. 3 break up and rearrange themselves to form a new grain structure as shown in the micrograph. The annealed steel of the structure shown is now in excellent condition to withstand further cold work in reducing it to finer sizes; or, if already at finished size, is in good condition to meet the demands of annealed wire service.

The effect of reduction of section incident to wire drawing on the tensile strength and ductility of steel wire, and the marked change brought about in these characteristics by annealing, as just outlined, is shown in Table 1. This table is based on drafting and annealing practice in reducing a low carbon steel rod—in this case 0.10 per cent. carbon—to a fine size of wire. It will be noted that between 80 per cent. and 90 per cent. reduction from the rod or annealed wire can be taken before annealing is necessary.

It is found in practice that in cold drawing from a soft rod or annealed wire, the increase in tensile strength is a direct function of the amount of cold work, almost independent of other conditions. Annealing practically brings the rod or wire, regardless of size, back to its original condition with regard to tensile strength and ductility. It will be noted that the final annealing does not bring the tensile strength as low as previous annealing. This is due simply to the fact that in annealing the fine sizes it is usual, in order to avoid the mechanical sticking of the wire in coils, to anneal at slightly lower temperatures than in ordinary process annealing.

The Effect of Dead Soft Annealing.—The effect of "dead soft" annealing upon the physical properties of wire is shown below the process annealing column in Table 1. The reason for this difference is that in heating above the critical temperature range the pre-existing structure is entirely obliterated, due to the iron and iron carbide going into solid solution and in cooling down forming a new structure. On the other hand, in annealing below the critical temperature the pre-existing structure is simply broken up and re-arranged but not entirely obliterated, and the deformation introduced by the cold work is thus not entirely removed. In the annealing of low carbon steel wire, the rate of cooling from the annealing temperature is of little consequence as affecting structure, a fact which is much appreciated in the wire industry.

REFINING THE GRAIN BY ANNEALING

The second important function of annealing is that of refining grain, and its practical application in the wire mill covers principally the medium and higher carbon steels. The structure of wire rods with regard to size of grain is dependent upon the temperature at which the rods are finished in the hot rolling mill and upon the rate of cooling through the critical temperature of the steel. In steel of low carbon this is not of as much importance as in the higher carbon steels, for the reason that the ordinary finishing temperature variations of good rolling mill practice have less effect on grain structure of soft rods, and therefore less effect on their physical properties. In higher carbon steels a fine grain is important, for it is this structure that makes for such steels their field of usefulness, where high strength, high elastic limit and toughness are required.

Theoretically, the ideal structure would be obtained if the entire rod could be finished at about the critical temperature. But this is, of course, impracticable, for the reason that it is impossible to regulate the finishing temperatures so closely, and for the additional reason that there is, necessarily, particularly in rolling very long lengths of very small sections, a marked difference between the finishing temperatures of the first and last end of a rod. The higher the finishing temperatures above the critical range the coarser the grain, and the coarser the grain the more does the steel lack the qualities that give it value. In order to destroy the coarse or uneven structure that may be created as just described, it is necessary to anneal the steel

Fig. 4—Steel wire (0.08 carbon) hard drawn and then annealed below the critical temperature

Fig. 5—Steel (0.45 carbon) overheated

Fig. 6—Steel (0.45 carbon) annealed

by heating it just above its critical temperature and slowly cooling it down. Above this range the coarse crystalline structure which previously existed is entirely obliterated, due to the iron and iron carbide going into solid solution, in exactly the same manner as was described in connection with the dead soft annealing of low carbon wire.

The effect of overheating in coarsening the grain structure of a 0.45 per cent. carbon steel and the refining influence of this type of annealing is shown in Figs. 5 and 6.

CREATING DEFINITE STRUCTURE BY ANNEALING

The third and last class of annealing to be described—that to obtain definite structure—is one of comparatively recent development in the steel wire industry and one which promises to be of considerable value. Heat treatment scientifically applied and controlled has opened a field of unusual opportunity. It cannot be said that the use of the microscope and pyrometer has led to the discovery of anything new in the way of heat treatment processes; nor have they created new fields for the employment of wire. They do accomplish, however, two important things: 1. The making of a product of higher quality than had hitherto been the case, by supplying a material of superior structure for the purpose, and of greater uniformity than could possibly have been the case under less intelligent direction in manufacture. 2. The placing of the manufacture of such materials in the wire mills on a scientifically improved basis, with fewer rejections and consequently with less cost to the user. To-day a wire problem essentially involving structure is first studied under the microscope until the structure giving the best results is found. After that, by means of the pyrometer and other improved facilities of the present up-to-date wire mill, it is a simple matter to see that the heat treatment necessary to supply the desired structure is employed in the practical manufacture of the wire.

Annealing of the type under discussion is applied principally to the higher carbon wires. Since the structure of such wires can be varied considerably within a small range of annealing temperatures, it covers specific products and not general classes, as would be the case in regard to the two previously described types of annealing. Figs. 7 and 8 illustrate excellently this special type of annealing. These photomicrographs show the structures of two annealed pieces of the same coil of high carbon wire, in which the annealing temperature of the one specimen was 1300 deg. F., and of the other 1250 deg. F. It is impossible to identify the structure by a simple observation of the fracture, which is the ordinary rough and ready method; nor is it possible to regulate annealing temperatures so closely without the use of pyrometers.

THE PRACTICAL SCOPE OF PATENTING

In passing to the next great class of heat treatment applied to steel wire, patenting, it is interesting to note that we likewise pass to another class of wire as regards grading by carbon content. It naturally covers the medium carbon steels, being employed chiefly on carbons between 0.35 and 0.85 per cent. In the medium carbon steel wires strength and toughness are required for both process and finished wire. Patenting makes possible this combination of strength and toughness, and to this process is due in large measure a broad field of application for steel wire.

Wire Rope.—From a tonnage standpoint, wire rope is the most important product of this class of heat treatment. In some respects it is the most important from a quality viewpoint, for the reason that in the manifold uses of wire rope the safety of human life is of vital consequence. There are also economical considerations relative to the handling of enormous tonnages at low cost, of which there is no better illustration than that furnished by the steel industry itself in the mining, loading and handling of tremendous quantities of ore and coal. There is probably no feature of the wire business that has been given more scientific study than the heat treatment of rope wire. Rates and degrees of heating and cooling have been standardized to such an extent through the use of the microscope, pyrometers and testing instruments, that a degree of uniform quality is reached that previously was impossible.

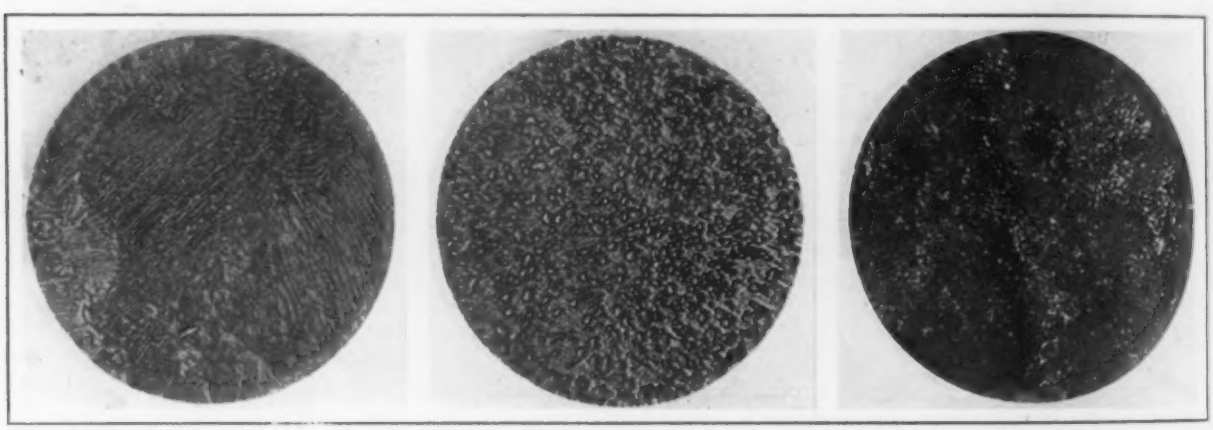


Fig. 7—Annealed (0.85 carbon) steel

Fig. 8—Specially annealed (0.85 carbon) steel for globular structure

Fig. 9—Patented (0.85 carbon) steel

Music Wire.—Another important class of wire dependent for its superior quality upon the patenting process is music wire for pianos and other stringed instruments. In order to have tone and hold pitch music wire must possess extremely high tensile strength and must also have suitable physical properties to enable it to be applied in the instrument. By a proper combination of drafting and patenting it is possible to obtain music wire from a 0.70 per cent. carbon steel which will have a tensile strength of 400,000 lb. per sq. in., and be sufficiently tough to be wrapped about itself without breaking, and be swaged flat to one-half its original thickness without splitting. Through this remarkable combination of properties, which in steel are usually antagonistic, music wire may justly be said to represent the highest development in the manufacture of wire. Without the patenting process as we know it to-day it would be impossible to produce wire of such characteristics.

The Structure of Patented Wire.—The high

CONDITION OF MATERIAL	GREEN ROD #5 GA. .207"	FIRST DRAFT	THIRD DRAFT	PROCESS ANNEALED	FIRST DRAFT	THIRD DRAFT	FIFTH DRAFT	PROCESS ANNEALED	FIRST DRAFT	THIRD DRAFT	FIFTH DRAFT	SEVENTH DRAFT	ANNEALED
PER CENT REDUCTION BY DRAWING	0	47	82	0	35	70	85	0	21	62	80½	88½	0
TENSILE STRENGTH POUNDS PER SQ. IN.	68 000	113 000	150 000	60 000	93 000	130 000	145 000	62 500	82 000	124 000	143 000	151 500	68 000
PER CENT ELONGATION IN TEN INCHES	25	2½	1½	30	3	2	1½	28	3½	2	1½	1	25

Table 1—Showing effect of cold-drawing and annealing on the physical properties of low-carbon (0.10 per cent.) steel
Note—Dead soft annealing gave a tensile strength of 50,000 lb. per sq. in. and an elongation of 32 per cent. both at the first and second annealing

strength and toughness of patented wire are due to its carbon condition and to its peculiar structure. The first step in the patenting process is to heat the wire to a temperature above its critical range. This, of course, causes the carbide of iron to become homogeneously distributed. In patenting, the degree of heating is regulated according to the carbon content of the steel, the size of rod or wire, and the time the material is subjected to the heat. After sufficient heating, the next step is to cool the material rapidly below its critical range, the structure obtained depending upon the rate of cooling. In practice, patenting is usually conducted as a continuous operation, the wire being led through the heated tubes of a furnace and cooled by being brought into the air or into a bath of molten lead comparatively cool but seldom under 700 deg. F.

A better understanding of the structure of a patented wire may be had by a comparison of the structure obtained by slow and by rapid cooling. If the steel after being heated is allowed to cool slowly through the critical temperature range, the homogeneous pre-existing solid solution of iron and iron carbide separates into a heterogeneous mixture of two constituents, resulting in the plate-like structure called "pearlite." In a patented wire, part of the carbide of iron is in solid solution and the remainder, while not in solid solution, has not had time to form into plates. The difference in structure between slow and rapid cooling is seen in Figs. 7 and 9. The photomicrograph of the patented wire shows, as a result of the rapid cooling, a structure that might be termed nondescript. Metallographists will recognize the structure as "sorbite," which, in the cooling of the higher carbon steels from above the critical temperature, is that stage of transition just preceding the pearlitic, the final condition of annealed steel as shown in Fig. 7. The patented wire, therefore, represents an unsegregated condition as against the segregated or coarsely laminated structure of annealed wire. The high tensile strength of patented wire is due to the amount of carbon in solution, and its toughness to the fineness of the grain structure.

Functions of Patenting.—Patenting serves two important functions in the wire business: 1. In the process of manufacture, the removal of the effects of cold work, such as drawing. 2. In the finished wire, to give in conjunction with cold drawing, the required combination of strength and toughness.

The effect of wire drawing on medium and high carbon wires is similar to that previously described in connection with low carbon wires. Strictly speaking, patenting is not necessary simply to relieve strain, for annealing would serve that purpose, but the structure obtained by patenting permits much further cold drawing than does the structure obtained by annealing. This is due primarily to the increased ductility and toughness of the patented wire. The effect of patenting as just described is shown in Table 2 and Figs. 10 and 11.

The table represents typical practice in manufacturing a certain wire of 0.50 per cent. carbon steel from a No. 5 gauge (.207 in.) rod to a finished size of 0.02 in. The rod in question as it came from the rolling mill had a tensile strength of 95,000 lb. per sq. in. and an elongation of 10 per cent. After the first draft of 28½ per cent. there is an increase in tensile strength of 27,000 lb. per sq. in., and the elongation is reduced to 2.9 per cent. After the first patenting of the wire it has a tensile strength of 115,000 lb. per sq. in. and an elongation of 8.2 per cent. It is then subjected to 4 drafts, being thereby reduced 65 per cent. from the first patenting point before the second patenting is necessary.

After the second patenting the wire has a tensile strength of 128,000 lb. It is then drafted 76 per cent. further before the final patenting, which leaves the wire with a tensile strength of 156,000 lb. The properties of the finished wire depend largely upon this last patenting and the subsequent drawing to the finished size. In the case in question the wire was drawn 3 drafts and reduced 66 per cent. from the last patenting size, ending at finished size with a tensile strength of 218,000 lb. It will be noted that the tensile strength of the wire immediately after patenting is higher as the size of wire decreases. This is due to the fact that in

CONDITION OF MATERIAL	GREEN ROD #5 GA. .207"	FIRST DRAFT	SECOND DRAFT	PATENTED	FIRST DRAFT	THIRD DRAFT	FOURTH DRAFT	PATENTED	FIRST DRAFT	THIRD DRAFT	FOURTH DRAFT	PATENTED	FIRST DRAFT	THIRD DRAFT
PER CENT REDUCTION BY DRAWING	0	28½	51	0	30	50½	65	0	30	66	76	0	30	66
TENSILE STRENGTH POUNDS PER SQ. IN.	95000	122 000	146 000	115000	143 000	163000	176 000	128 000	156 000	190 000	208 000	156 000	184000	218000
PER CENT ELONGATION IN TEN INCHES	10	29	28	82	28	27	26	7.8	20	1.9	1.8	60	20	1.9

Table 2—Showing the effect of cold drawing and patenting on the physical properties of higher carbon (0.50 per cent.) steel
Note—At the first patenting stage, process annealing gave a tensile strength of 70,000 lb. per sq. in. and 18 per cent. elongation

practice the smaller the wire the more quickly it cools, and consequently the greater the amount of carbon in solution. This, as explained previously, is the condition of a patented wire that makes for its strength.

In Table 2 and the note thereto are given the corresponding tensile strength and elongation of the same wire when patented and when annealed. It will be seen that the tensile strength of the annealed wire is 70,000 lb. per sq. in. as against 115,000 lb. per sq. in. of the patented wire. This is due to the fact that, on account of the comparatively slow cooling in annealing, none of the carbon of the steel is in solution. It might be supposed that, owing to its being softer and of higher elongation, the annealed steel would withstand a further degree of drafting than the patented steel. On the contrary, however, on account of the rapid loss of ductility characteristic of the annealed wire structure, the annealed structure will not withstand

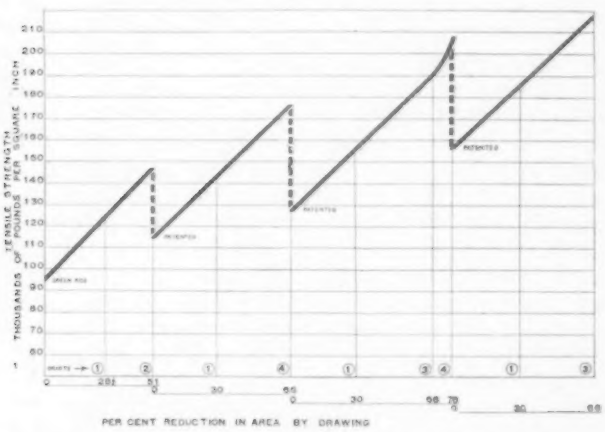


Fig. 10—Showing the increase of tensile strength due to drawing and the effect of patenting, medium-carbon (0.50 per cent.) steel

drawing to anywhere near the same degree as will the patented structure. Generally speaking, the patented wire structure has more than twice the ductility of the annealed.

Fig. 10 shows graphically the increase of tensile strength in cold drawing from a rod of 0.50 per cent. carbon steel, wire 0.02 in. in diameter and the effect of patenting in removing the results of the cold work. It indicates also the importance of the patenting process in creating a structure that permits an increase, by heavy drafting, of 50,000 lb. per sq. in. in tensile strength, and leaves in the finished wire a remarkable degree of toughness rather than brittleness. Incidentally, it may be noted from this chart that the same regular increase in tensile strength, due to drawing, is characteristic of the higher carbon steels as of the lower carbon steels.

Obtaining High Tensile Strength.—Fig. 11 shows a typical practice in obtaining a tensile strength of 375,000 lb. per sq. in. in a music wire 0.03 in. in diameter from a patented rod 0.192 in. in diameter, of 0.70 per cent. carbon. It indicates the marked increase in tensile strength from the last patenting point, and emphasizes the remarkable character of a wire of such strength possessing the workable properties necessary for music wire. It will be seen that from the last patenting point the wire is reduced about 94 per cent., elongated 18 times its length, and to do this on the wire in question, 19 drafts were taken. The increase in tensile strength per sq. in., due to this heavy drafting, amounts to about 200,000 lb. from the last patenting point. In the final drafts there is an enormous increase of tensile strength. In fact, as the curve shows, a certain reduction towards the end increases the tensile strength much more than an equal reduction near the patenting point. One might think a wire made according to the above practice would be as brittle as a clay pipe stem; but, on the contrary, it is singularly tough, and stands wrapping, bending and flattening to a truly remarkable degree.

PRACTICAL SCOPE OF HARDENING AND TEMPERING

Hardening and tempering is probably of broader commercial importance and application than any other type of heat treatment given to high carbon steels. In the past fifteen years it has been given tremendous impetus by the growth of the automobile business and the increased use of alloy steels.

Outside of the manufacture of wire, hardening and tempering are usually separate and distinct operations, but in wire the two terms always go together, there being practically no field of usefulness for wire simply hardened. It naturally follows, therefore, that in wire making, hardening and tempering should be conducted usually as a continuous process. In the making of tempered wire the material is first run through the heated tubes of a furnace, then quenched quickly in a bath of oil or water, then run into the tempering bath of, say, molten lead, each wire being in continuous motion from the time it enters the heating furnace until it is wound on a reel. Such wire products as springs made of untempered wire, hardened and tempered after forming, do not of course have the several steps conducted as a continuous process, but there is no difference in essential principles. Hardening and tempering apply to the higher carbon steel wires—those in which the carbon range is from 0.65 per cent. to 1.00 per cent.

The Process of Hardening and Tempering.—In hardening wire the first step is identical with that previously described for patenting, and is accomplished in practically the same manner. That is, the wire is heated above the critical temperature to enable the iron and iron carbide constituents to go into solid solution before quenching. After quenching, the steel, on account of its sudden cooling through the critical temperature, is hard and brittle. Cooling in this manner is too rapid to permit the segregation of the constituents, iron and iron carbide; and, as a result, considerable of the carbon content is in solid solution, the amount depending upon the total carbon in the patenting it was pointed out that carbon in solution causes hardness in the wire. It will be apparent that in hardening, as above defined, the amount of carbon held in solution will be much greater than in the patenting process, due to the much more rapid rate of cooling through the critical temperature, secured by the use of a quenching bath of low temperature. The structure thus obtained in the hardened wire depends on the rate of cooling. The hardness is finally lowered to the desired degree or "temper" by carefully adjusting the temperature of the "tempering" bath.

This process, simple as it appears, is in practice the most complicated in principle of any of the heat treatments described, and demands great accuracy of temperature control to secure the fine shades of temper demanded by the multiplicity of uses to which the finished product is applied by the consumer.

In passing it may be stated that the field of commercial tempered wire requirements is such as to necessitate a wide range of temperature on the various quenching baths in the tempering room of a wire mill. In general, the reheating incident to

tempering is usually considerably below the critical temperature.

Effect of Tempering on Tensile Strength.—With varying tempering temperatures between 500 and 1100 deg. F., the tensile strength runs from about 340,000 lb. per sq. in. to 150,000 lb. per sq. in. At the lower temperature the decrease in tensile strength is, as we should expect, much greater per 100 deg. F. range than at the higher temperatures. From 500 to 600 deg. F. there is a drop of 60,000 lb. per sq. in.; while between 1000 deg. F. and 1100 deg. F. the drop in tensile strength amounts to only about 10,000 lb. per sq. in.

CONCLUSIONS

From the foregoing discussion of the several heat treatments of importance in the wire business it will be apparent that at the basis of the industry there are certain fundamental laws which govern all processes in the manufacture of steel wire, whether

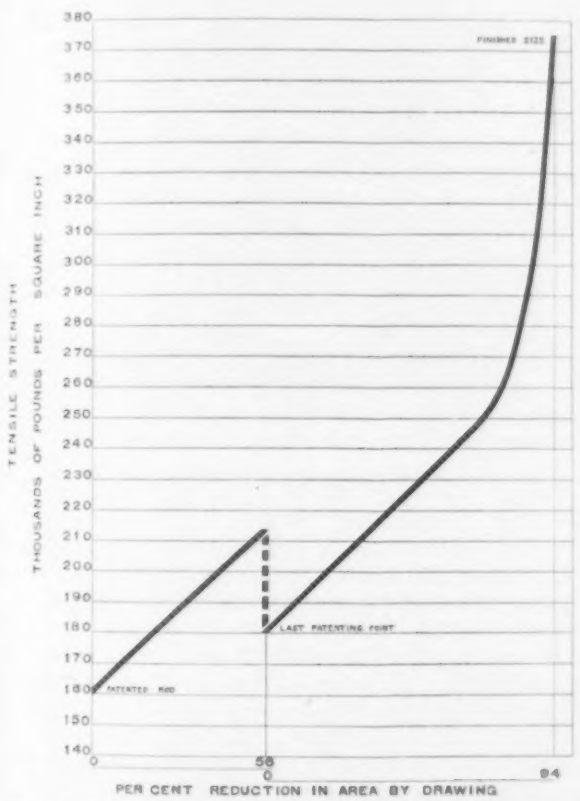


Fig. 11—Showing the process for producing 0.03 in. wire (0.70 per cent carbon) having a tensile strength of 375,000 lb. per sq. in.

it be cold treatment incident to drawing or heat treatment incident to the various operations described herein. Like all natural laws, those governing the behavior of steel in the manufacture of wire are inexorable, and the results obtained depend primarily upon the determination of those laws and upon their proper recognition and consideration in actual practice. Herein lies the reason for the vast difference between wire mill practice of the past and that of the present. The heat treatments which are applied to-day with such beneficial results were known then, but the underlying laws governing them were not. The scrap and rejections in the wire mill, the lack of uniformity and the unsuitable quality of the product, and the complaints of customers were all too frequently ascribed to the "devil in the steel." With the establishment in the past few years in our colleges of broader courses for the study of the nature and behavior of steel, and the resultant advent into the steel business of technically trained young men, and with the establishment of laboratories for the study of practical steel problems, with their invaluable aids in the shape of the microscope and the pyrometer, there has been given an impetus to a development in the steel wire business that has been unprecedented. The present day wire mill, with its hundreds of pyrometers and automatic temperature regulating and recording apparatus, gives silent but forceful testimony to the passing of the old type of "practical" man whom Professor Sauveur has described as "the industrial Philistine clumsily standing in the way of scientific applications to industrial operations."

In the works with which I am associated, a physical laboratory for the study of heat treatments and other metallurgical problems connected with the manufacture of high grade wire was established several years ago. A convincing proof of its practical value lies in the fact that the facilities for carrying on this work have been steadily increased. To-day we have a large force of technically trained men in this laboratory, a costly and extensive equipment, and a separate building devoted entirely to the work.

Our physical laboratory is in every sense a practical and efficient adjunct to our producing department. Of fundamental importance in the practical application of the work of a laboratory of this kind, is the training of the men carrying on the work. To make their work of the greatest value, these men should be more than merely technically trained. We believe that the excellent results we have obtained in the heat treatment of wire are due in large measure to the fact that our laboratory men, in investigating a problem, study first all the conditions pertaining to the uses to which the product is to be put by the customer, and follow personally all investigations and experiments in the works' processes bearing on the subject.

In this way our laboratory men are made to recognize practical conditions, while our workmen become thoroughly trained as to the problem and the methods adopted for its solution. Thus, we have found it possible to overcome prejudice which the practical man often has for "theory," and to establish in its place a spirit of eagerness for better practice.

The results already obtained warrant us in feeling that there is ahead of us abundant opportunity for making steel of even greater value in the service of mankind.

High-Pressure Boilers with Divided Baffles

Three 540-hp. water-tube boilers manufactured by the Heine Safety Boiler Company, St. Louis, Mo., have been installed in the Lytton Building, Chicago, Ill. They are of the high-pressure type and have a divided method of baffling. The lowest row of tubes is encircled by L tiles to within about 5 ft. of the rear water leg. This tiling serves as a roof for the furnace and combustion chamber and permits of a simple arrangement of the McKenzie chain grate stokers which are used. This arrangement is also relied upon to give room for the flames to burn out without an excessively high setting. As the gases enter the boiler they divide into two streams, one flowing beneath and the other above the middle baffle which rests upon the ninth row of tubes with an opening both at the front and rear. The top baffle extends from the rear water leg to several feet of the front one, leaving an opening for the discharge of the gases from the boiler tubes. Before passing to the smoke outlet the gases flow under the boiler drums.

Welded Joints on a Steel Hand Truck

The Standard Improved Truck Company, Chicago, Ill., has recently substituted joints welded by the Oxweld process on a test truck, for the former drilled and riveted joints. This change in the method of manufacture has resulted in increasing the efficiency at the welds 482 per cent., and has also augmented the output per man about 20 per cent., with a saving of over 30 per cent. of the previous cost of manufacture per truck.

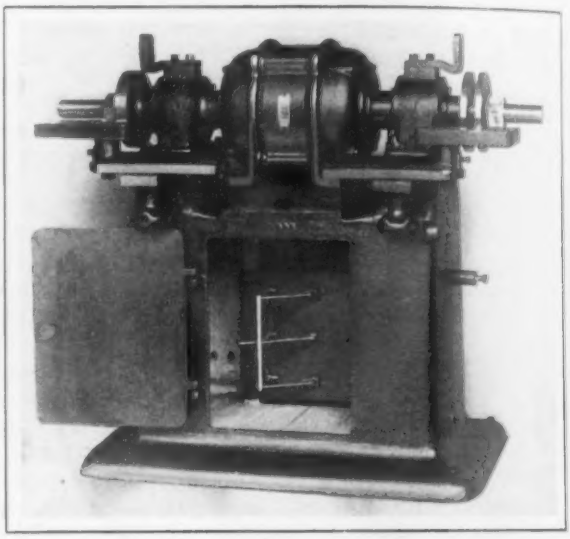
To determine just how great were the advantages of this type of joint, a series of special tests were made by Robert W. Hunt & Co. on the riveted and welded connections of the tubular steel rack. Three connections were submitted and were tested under identical conditions. In all the connections tested the tubes forming the joints had outside diameters of 1.67 and 1.41 in., respectively, the metal of each being 0.13 in. thick. In the test of the first connection, which was welded by an oxy-acetylene torch, the smaller tube, which was the one to which the tension or pull was applied, commenced to scale under a load of 17,090 lb., indicating that the elastic limit of the steel in tension had been reached. Considerable reduction in the cross-section of the larger pipe at the point of connection was noticed at a pull of 24,540 lb., but there was no sign of rupture at the weld. Under a maximum load of 25,460 lb. the smaller tube broke away from the larger at the weld.

The second connection was a riveted one with two ¼-in. rivets in double shear. One of these rivets was inserted in each tube through a plug and bushing inserted in the smaller one. Under a load of 2920 lb. a 1/16-in. slippage of the connection was observed, due to the bending of the rivets and the loosening of the connection, and the rivet in the larger tube sheared off under a maximum load of 4740 lb. The third connection was also riveted, having a ¼-in. rivet in double shear in the smaller tube, and a ¼-in. riveted connection in an inserted plug through the larger tube, the head of the latter rivet being in tension. This connection behaved slightly better than the second one, it requiring a load of 3060 lb. to cause a slippage of 1/16 in. in the connection as a result of the bending of the rivet in the smaller tube and a general loosening of the connection. The separation at the point of contact increased ⅛ in. when a load of 4010 lb. was applied, and with a maximum load of 5800 lb. the rivet in the smaller tube sheared off and the rivet connection in the larger one pulled partially through it.

A Steel Hand Truck in Which All of the Joints Are Welded

A Motor-Driven Dry Grinding Machine

The Ransom Mfg. Company, Oshkosh, Wis., has brought out a direct-connected motor-driven dry grinding machine. It is equipped throughout with ball bearings.



A Double-Spindle Dry Grinding Machine Equipped with Motor Drive

The spindle is 2 in. in diameter at the end where the wheels fit and ⅝ in. larger between the bearings. This shaft is supported at either end of the motor by ball bearings of the double rim self-aligning type. The races fit into housings 5¼ in. in diameter which are held securely to the frame. The machine is furnished with steel guards having exhaust pipe connections, but they have been removed to give a better view of the bearings. One of the supporting points for the wheel guard is above the ball bearing and the other on the end of the frame below the arbor.

The machines are built for a wide range of sizes with a belt or motor drive. They are intended for use with wheels having a diameter of 16 in. or larger, the machine illustrated being designed for operating two 24-in. wheels with a 4-in. face. This machine is driven by a 5-hp. 60-cycle three-phase motor operating at 900 r.p.m. The motor is bolted to the main frame of the machine and can be furnished either in the open or inclosed type, the former being recommended, although the latter is the one illustrated. One of the machines was put in service on heavy foundry work for a period of five months. Two men kept it constantly in use, but it is stated that at the expiration of this time an examination failed to reveal any appreciable wear in the bearings.

The Driver-Harris Wire Company, Harrison, N. J., is contemplating adding a one-story building, 100 x 200 ft., to its cold rolling plant, to increase its capacity for cold rolling strip steel as well as special alloys in flat wire.

New Oil Engine Driven Air Compressor

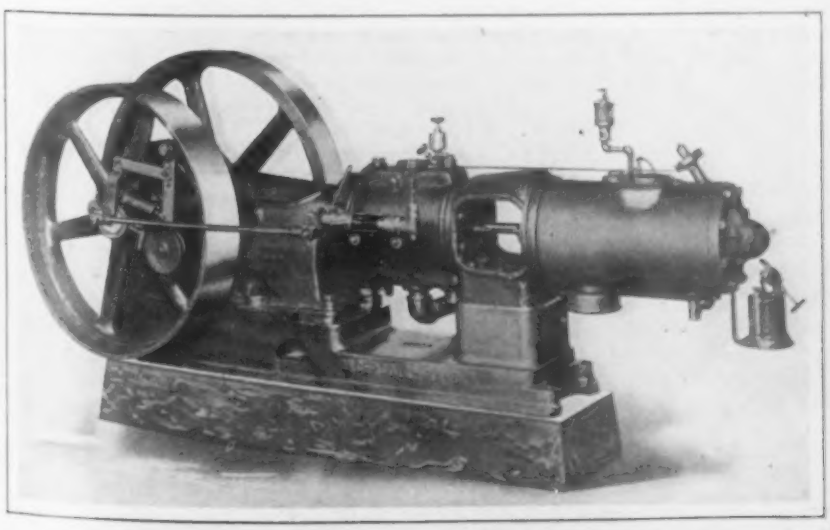
The Ingersoll-Rand Company, 11 Broadway, New York City, has designed an oil engine driven air compressor. The machine is of the direct-connected straight line type and resembles the builder's standard line of small compressors in this respect and also in the design of the air end. It was brought out as the result of an increased use of low grade oil fuel for power purposes, and the special features of the machine are the design of the driving end and the introduction of a small quantity of water from the cylinder jacket into the compression space.

The main frame is entirely inclosed and is designed for the splash system of lubrication, removable covers being provided. As will be noticed from the accompanying illustration, the driving end of the compressor consists of a single oil engine placed behind the air cylinder and directly connected to the piston by an extended piston rod. The general design of the engine approximates the hot bulb type, which is really a development of the Diesel engine. It is emphasized that this engine is an ideal type for compressed air service, as it combines a high thermal efficiency with a very simple construction, there being an entire absence of auxiliary air compressors, etc., combined with a lower working pressure. The power cylinder is of the single-acting two-cycle type with a water jacket, which is supported by a heavy distance piece, reaching to the foundation and bolted to the air cylinder. It is fitted with a torch for heating the ignition bulb as a preliminary to starting. When the compressor is in operation the torch is dispensed with.

A small pump on the side of the frame operated by the main shaft, automatically injects the fuel into the combustion chamber in the form of a finely atomized spray. After the fuel enters the combustion chamber it is conveniently ignited by the hot bulb, which does away with electric sparking devices, batteries, etc. A centrifugal governor located in the flywheel controls the stroke of the pump, and this is supplemented by a regulating device on the intake to the air cylinder. In this way it is pointed out that the amount of fuel injected into the cylinder is proportional to the load on the engine.

The introduction of a small quantity of water from the cylinder jacket into the combustion space is a feature of this engine which is relied upon to regulate the temperature of the cylinder and prevent an undue rise in the temperature of the piston to cause disssociation of the fuel. It also has a tendency to reduce the maximum pressure in the cylinder and increase the mean effective pressure slightly to give a smooth running machine. The amount of water injected is regulated according to the load on the compressor.

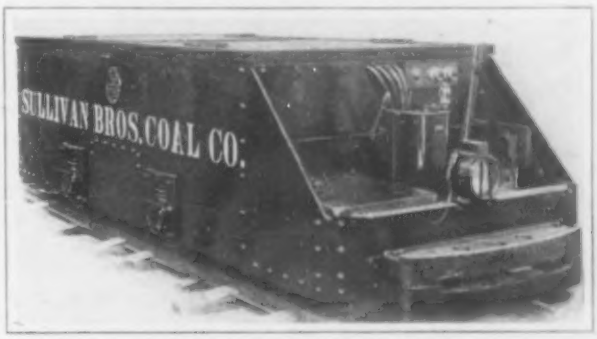
At the present time one size of compressor is built, having an actual capacity of 66 cu. ft. of free air at 100-lb. pressure and 73 cu. ft. at 80 lb., when operating at a speed of 325 r.p.m. The fuel consumption under average operating conditions, is approximately 2.2 gal. of kerosene per hr. Fuel oil or distillate can also be used to supply the power. The complete weight of the compressor is 3000 lb. and the floor space occupied measures 29 x 106 in.



A New Self-Contained Oil Engine Driven Air Compressor

New Type of Storage Battery Locomotive

A new type of storage battery industrial locomotive has been brought out recently by the Atlas Car & Mfg. Company, Cleveland, Ohio. This is of the armor plate type of construction, the body being built entirely of plates without a structural frame. It is a tractor locomotive, weighing 8 tons, and built very low so that it is adapted for use in coal mines, but is also designed for industrial plants. It is driven by two motors, one at each end, which are suspended from the axles. Power is transmitted from the motors to the axles through gears.



A New Storage Battery Locomotive for Industrial Plant Service Having a Plate Body and No Structural Frame

The locomotive is equipped with a drum type of controller, spring buffers and sanders that supply sand to all the wheels. It is built in the 42-in. gauge and has 20-in. wheels. The locomotive is 172 in. in length over all, 60½ in. wide and 43½ in. high.

The General Electric Company has received the following among recent orders: Aluminum Company of America, Pittsburgh, Pa., for its new power plant at Massena, N. Y., eighteen 2500-kw rotary converters and nine 5000-kw. water-cooled transformers; Cyclops Iron Works, San Francisco., Cal., two 15-hp., four 30-hp. and four 37-hp. induction motors; Crucible Steel Company, Milwaukee, Wis., on 500-kva. and three 10-kva. transformers; John A. Roebling's Sons Company, Trenton, N. J., fifteen 20-hp. motors and starters; Riter-Conley Mfg. Company, Pittsburgh, Pa., seven small motors, six 10-hp. and ten 25-hp.

More than 1,000,000 motor cars are at present in operation in the United States. There is one automobile for approximately every 100 persons.

Vertical Metal Band Sawing Machine

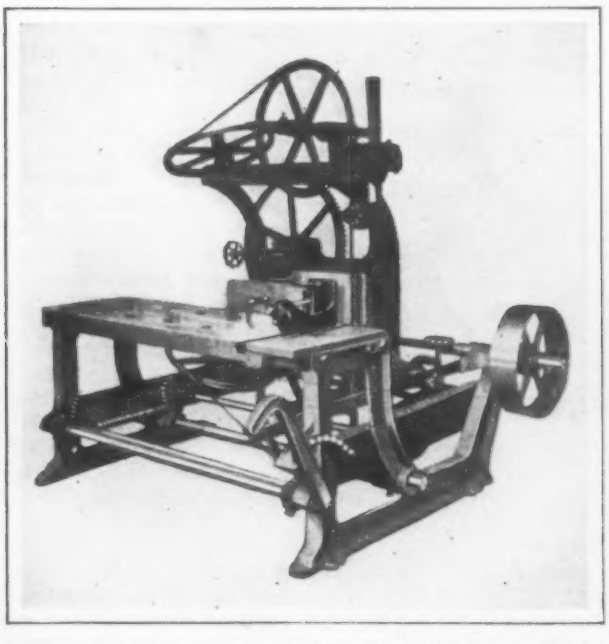
For cutting metal to various lengths and at any desired angle, M. E. Shinn & Co., 1846 West Lake street, Chicago, Ill., have developed a new type of vertical gravity feed metal band saw machine. The machine is entirely automatic and one of the features about it is the way in which the non-cutting part of the blade is returned so as not to interfere with the material being cut.

As will be noticed from the accompanying cut the machine is designed so that there is nothing to interfere with the metal irrespective of the length that is being cut. By means of an adjustable radial back and the vise which operates in a groove in the table, the material can be cut at any desired angle. By removing a cap screw the lug at the right of the radial back can be removed so that the table is entirely clear and any length can be sawed longitudinally, there being a clearance of 8 in. between the saw and arbor frame. The saw arbor is mounted upon four ball bearing wheels, two of which have gears attached. These travel in channels to guide the saw arbor in alignment. The inclination of the plane of the trackway is altered by the operating lever at the right side of the machine below the table which regulates the feed. By this arrangement the cutting part of the saw is kept in a vertical position during the entire length of the cut and the gravity feed is constant throughout the operation and can be accelerated or retarded by the operating lever according to the size of the material being cut.

The non-cutting part of the blade is returned by passing over wheels in such a way as to obviate any interference with the material being cut. At the same time the cutting edge is left perfectly vertical and free from twist while passing over the two wheels which carry the working part of the saw. In this way it is emphasized that the saw runs straight in the line of the cut and accuracy in cutting and longer life to the saw band are insured.

The action of the saw is entirely automatic, and after the cut is completed the saw is brought to a stop so that it can be adjusted to any width of material. This stop operates a clutch attached to the drive pulley on the machine and can be adjusted to suit any width of the material, the saw having a cutting capacity for material up to 11 x 12 in. The saw used with this machine is 15½ ft. long, ⅝ in. wide and 0.0312 in. thick. At ordinary operating speed this machine will cut cold rolled shafting 2½ in. in diameter in 3 min., or 6 in. in 23 min.

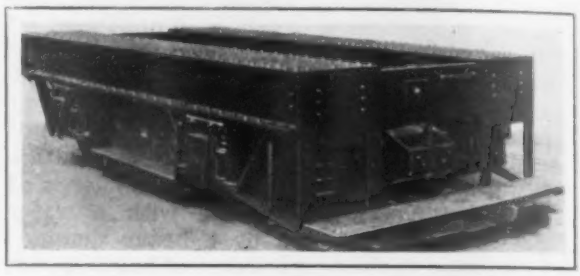
The amount of floor space occupied by the machine is 14 sq. ft., measuring 45 x 45 in. The table is 42 in. long and is 18 in. from the floor, which is relied upon to facilitate the handling of heavy material. The crated shipping weight of the machine is 450 lb. While the machine illustrated is designed for belt drive, back geared motor drive can be supplied if desired.



A New Type of Gravity Feed Vertical Metal Band Saw Machine

Storage Battery Truck for Armor Plate

A new type of storage battery industrial locomotive having a capacity of 60 tons has recently been built by the Atlas Car & Mfg. Company, Cleveland, Ohio, for handling armor plate in the plant of the Homestead Works of the Carnegie Steel Company. This locomotive is not designed as a tractor, material being placed on the flat top of the locomotive, which is very low. It is of very heavy construction to carry the heavy loads for which it is designed.



A Storage Battery Truck Designed for Transporting Armor Plate

The frame is built of box type girders and heavy plates and is supported on spring pedestals. The locomotive is driven by two 6½-hp. motors, which are spring suspended from the front axle and is controlled from one end by an automobile type of controller. It is intended for use on standard gauge tracks and runs on four 30-in. rolled steel wheels.

The principal over-all dimensions are: length, 169½ in.; width, 87¾ in., and hight, 38 in. The same type of locomotive of lighter construction and capacity is being built for handling plates and other material in steel plants.

Silicon castings, it is claimed, are successfully made by T. B. Allen under a patent (U. S., 1,073,560) granted to him. Silicon made in electric furnaces usually yields castings full of blowholes because of the presence of oxides, oxygen and nitrogen. The inventor claims to remove these impurities by adding calcium, magnesium or vanadiam. From 0.5 to 3 per cent. of Mg is added to the molten silicon in a crucible kept hot in an oil or coke furnace. When no further action is observed the castings are poured. The castings resist acids and are suitable for chemical ware.

The Alloy Metals Foundry Company, Belleville, Ill., has been organized for the purpose of making semi-steel castings for use for ammonia purposes or wherever close-grained tough castings are to be used. For the present, the company has rented one of the buildings of the Germania Refrigeration & Machinery Company, whose castings it will make, but it desires to get as much outside work as possible. The equipment is in place and the company is in position to take business. E. E. Wangelin is president.

A MULTIPLE-SPINDLE MACHINE

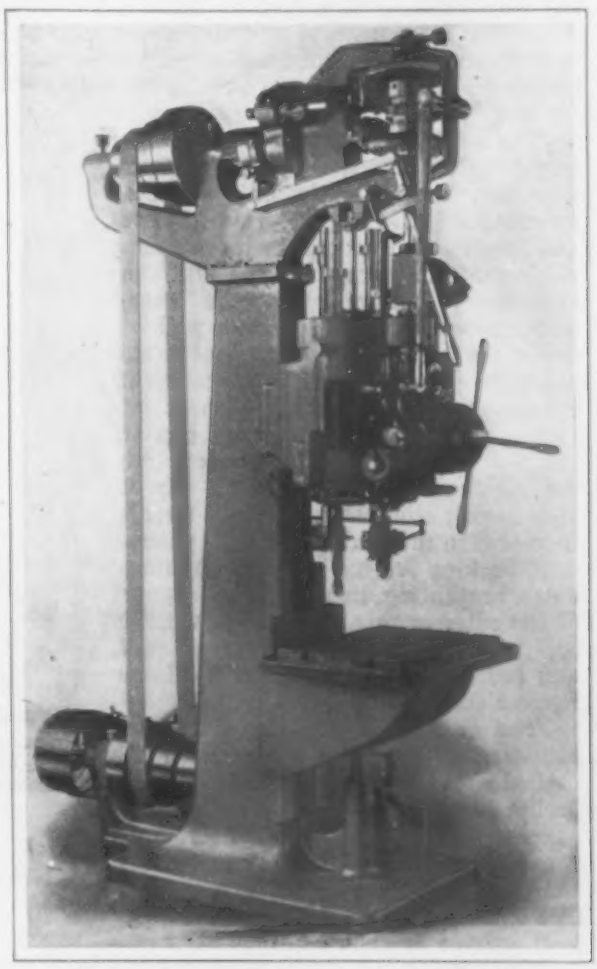
Automatic Vertical Turret Tool for Series Operations Without Shifting Work

The Turner Machine Company has recently completed a new automatic turret machine in its Danbury, Conn., plant. It is designed for heavy duty and is intended to complete a series of operations without shifting the position of the work or changing the tools. Each spindle carries a different tool, which successively and automatically registers in precisely the same position, it being emphasized that the automatic feature is not cumbersome or complicated. The axis of the turret is vertical and it revolves in a horizontal plane. The rotary action is entirely automatic, as when the operator returns the spindle to its full hight, the turret automatically indexes to the next spindle.

The spindles are of heat treated nickel steel and are finished by grinding over their entire length. The driving gears on the vertical spindle shaft are of heat treated chrome nickel steel and ball thrust bearings are located under them at the top of the turret and also at the bottom of the spindle to take the upward thrust of the tools. The detents are adjustable, both for wear and accuracy and are made of chrome vanadium ball race heat treated steel. These detents are located further from the center of the turret than are the working tools or spindles, which is relied upon to give and maintain a high degree of accuracy. The spindles may be fed by either hand or power, using either a hand lever or handwheel for the former. The latter is the more sensitive and adapts the machine for profiling and similar milling jobs. The inactive spindles are locked in their extreme upper position, and as each spindle is automatically swung into its working position the lock releases and its full weight is carried by an adjustable spring, which is used for all of the spindles. The spindles project approximately 1½ in. beyond the sleeve which is 12 11/16 in. long. There is a ball thrust bearing between the spindle nose and the end of the sleeve, and the spindle has a bearing of 4 in. at each end of the sleeve with an oil chamber in the center. The upper end of the spindle is guided in the turret, which is 17 in. long. It is pointed out that this method of supporting the spindles so close to the nose, in conjunction with the long bearings placed some distance apart, gives rigid support and guidance.

Each tool has its own individual feed, which may be by hand if desired, an arrangement which adapts the machine for use with small and delicate tools, such as small drills, taps, etc. The feed mechanism is driven from the vertical shaft which drives the spindle. As an automatic trip is provided which will engage or disengage the feed without stopping the machine, it may be set for a predetermined amount of spindle travel. The gears are inclosed in a dustproof case and provide four changes with a direct drive on the coarser feeds. Two spindle speeds are available, which in connection with the geared feed give eight possible rates. Helical chrome nickel steel gears are used for driving the feed. The gears do not run except when in use, and three sets of worms and worm gears are employed. The first two run at high speeds and lower pressures than the final set, the thrust of the first two being taken on multiple washers and of the last by a ball thrust bearing. The back gears are operated by a Johnson friction clutch, which can be thrown out of engagement like the back gears of a lathe when not in use. The tapping gears operate to reverse the tap or die at a ratio of 1.6 to 1, and can be disengaged by an intermediate gear when not in use.

The table of the machine, which is slotted, has a working surface of 18 x 23 in., with an oil groove entirely surrounding it. A gear-driven pump with an oil tank and a separate flexible oil supply pipe furnish oil to the cutting tools. The table is separate from the knee and has a three-point support upon it which permits easy leveling if the table has been redressed or planed.



A Recently Developed Automatic Vertical Turret Multiple-Spindle Machine Intended to Complete a Series of Operations without Shifting the Work or Changing the Tools

New Cincinnati Plan Engineering College

The directors of the Municipal University of Akron, Ohio, have established an engineering college which has adopted the Cincinnati plan and offers a five-year co-operative course in engineering. This plan requires the practice of engineering to be learned under actual commercial conditions, and the science underlying this practice to be taught in the school by trained educators. The number of students that can be accepted is limited, and applications for admission should be filed with the dean of the college before July 1, 1914. Applicants will be assigned to shopwork at that time, and accepted as students in September.

The shops of the Minneapolis, St. Paul and Sault Ste. Marie Railway at Fond du Lac, Wis., beginning June 1, will be put on a ten hours a day and six days a week schedule. The present one calls for nine hours a day, five days a week.

COULTAS THREE-PASS STOVE

Its Masonry Construction in Units and Free Passage of Gases Are Features

The Coultas three-pass hot-blast stove which has been recently developed by Searing & Coultas, engineers, Pittsburgh, was designed for high blast temperature, minimum friction, and even distribution of gas through all flues, with a long life for the brickwork.

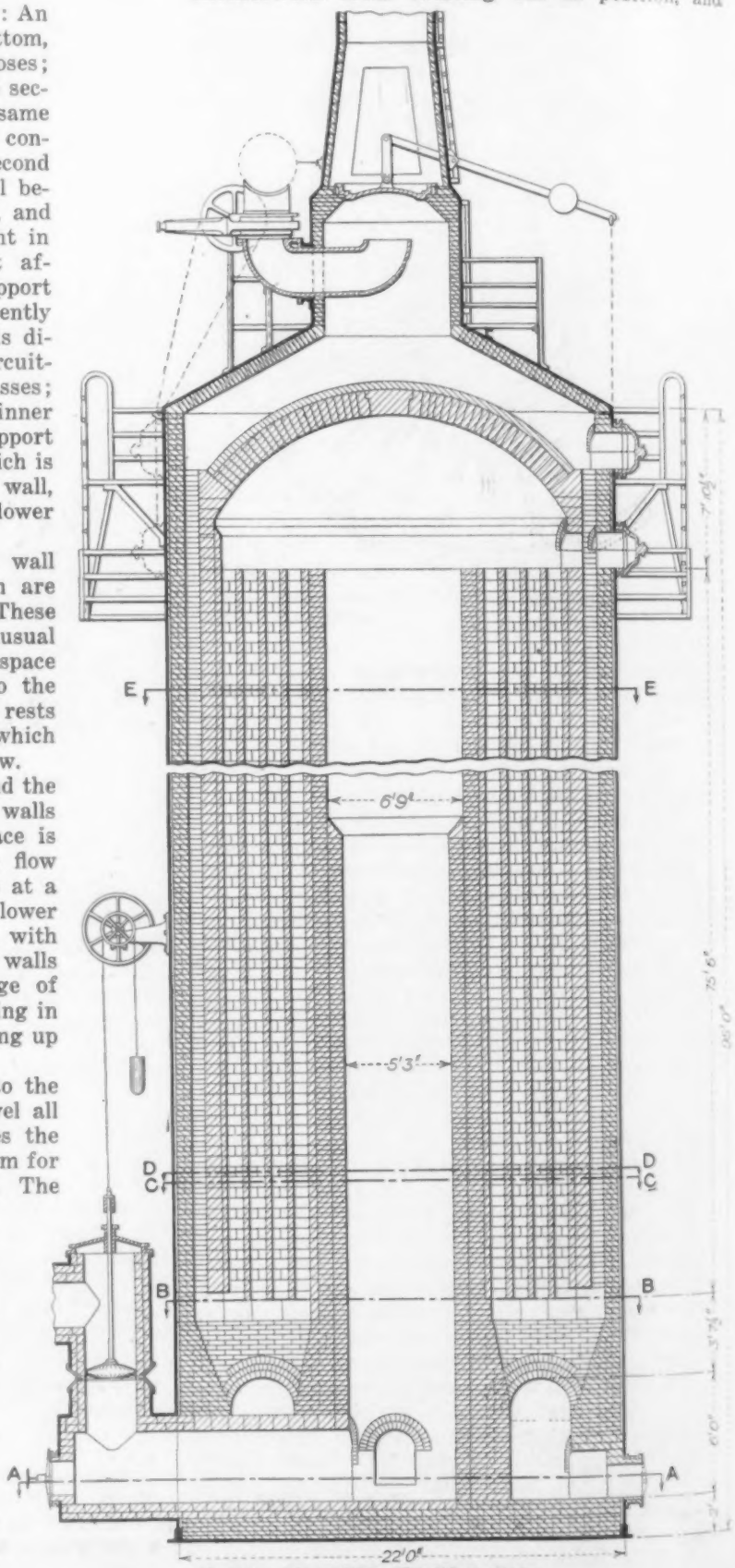
The most important features are: An unobstructed dirt space in the bottom, with easy access for cleaning purposes; an equalized flow of gases from the second pass to the third pass with the same stack draft on each flue; the unit construction of the well wall, the second pass checkerwork, the division wall between the second and third passes, and the third pass, allow free movement in expansion and contraction without affecting the adjacent units; solid support for the division wall and consequently for the inner dome, carried on this division wall; elimination of short circuiting between the second and third passes; solid backing for the skews of the inner dome, preventing distortion; the support of the outer or third pass dome which is carried independent of the shell wall, and reduced blast friction in the lower part of the stove.

The checkerwork and division wall are carried on radial walls which are arched above the dirt chamber. These arches are 9 in. thick, giving unusual supporting strength with ample space for dirt to drop between them to the chamber below. The division wall rests also on the radial walls at a point which is supported by solid masonry below.

By carrying the checkerwork and the division wall on top of these radial walls a large and unobstructed dirt space is obtained below. Since the gases flow from the second to the third pass at a point above the dirt space, the lower portion of the stove can be filled with dirt to the arches in the radial walls without affecting the free passage of the gases. This prevents overheating in the top of the stove due to a backing up of gases.

The change from the second to the third pass occurs at the same level all around the stove, making all flues the same length, and there is ample room for the gases to flow to the third pass. The stack draft is the same in all flues. The upper part of the combustion chamber is large, giving an opportunity for the gases to expand with equalized draft conditions and freedom from choking in the bottom. The gases of combustion enter the second pass flues at a high temperature which is maintained quite uniformly toward the bottom of the checkerwork, giving high heat over a very large area of heating surface.

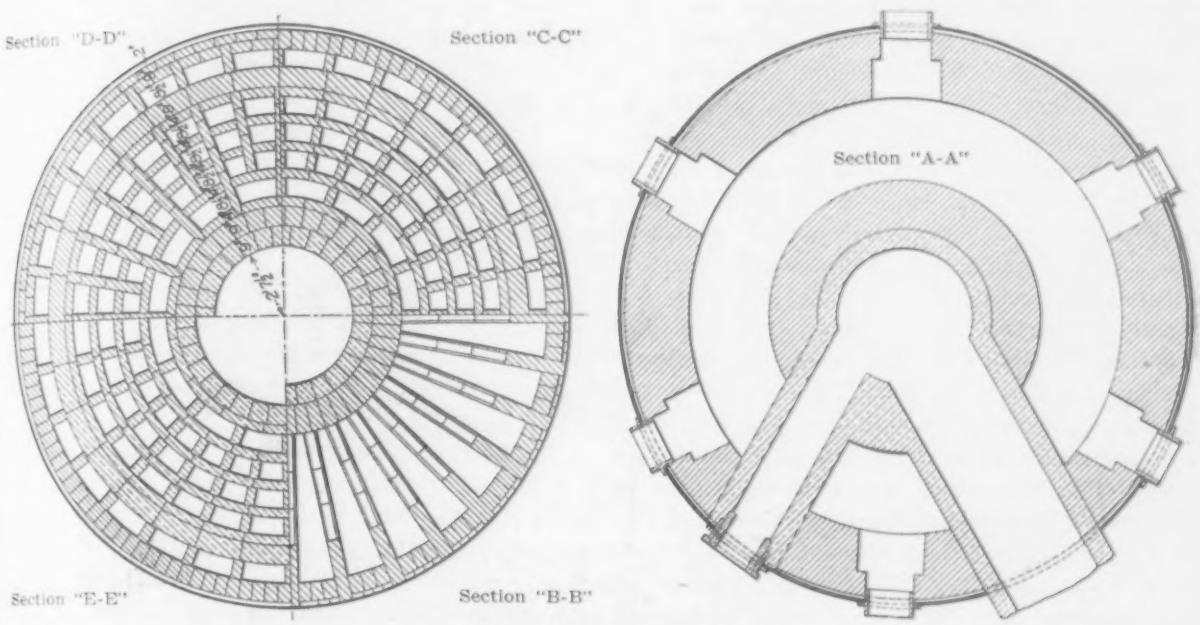
In addition to the indirect heating surface the area available for direct heating is large, beginning at the top of the arches in the radial walls at the bottom, and extending to the top of the checkerwork. The second pass checkerwork is bonded within itself, but is independent of the well wall and of the division wall, and will rise and fall as one unit under varying temperatures. The skin wall around the well wall is designed so that none of the brick can be forced out of place. It thus forms an effectual means of preventing the checkerwork from twisting out of position, and



Coultas Three-Pass Hot-Blast Stove

also the skin wall next to the division wall. The division wall between the second and third passes is built up of circular blocks which are kept from moving inward or outward by the radial walls in the checkerwork on the inner and outer sides.

Adjacent to the skew line of the inner dome the brick work is built solidly against the steel shell, thus transmitting the outward thrust of the dome to the steel work. With a firm supporting wall below it and with the skews well backed up this inner dome cannot become distorted or allow



CROSS-SECTIONS OF COULTAS STOVE

openings to appear which will cause short circuiting to the stack. The outer, or third pass dome, is carried on a shelf angle which is a part of the steel shell. Thus the dome can be rebuilt in sections without its removal entire. The shell wall can rise and fall independently of the dome.

The well and the division wall are built as independent units, forming a space between them for the second pass checker work, which makes it possible to remove and replace the well wall or the checker work without interfering with the adjoining units. The division wall can also be removed without affecting the third pass walls, and the shell wall can be removed without touching the outer dome.

The second pass checker work does not have to come level with the surrounding walls, course by course, and in an emergency standard 9-in. brick can be used in repairing the checker work. In changing from the third to the second pass, the incoming cold blast can enter the second pass flues with a minimum of friction in the bottom of the stove.

"Vanadium in Brass" was the subject of a paper by R. J. Dunne and O. F. Hudson before the Birmingham section of the Institute of Metals, England. It was stated that published results, though few in number, of tests of vanadium brasses indicated that the use of cuprovanadium gave a considerable increase of strength and that it reduced the tendency to corrosion decidedly. It was thought probable that the beneficial effects of vanadium were due to its deoxidizing power.

The American Locomotive Company has received an order from the Cuban Railroad, Cuba, for 13 engines for August delivery.

INTOXICANTS AND ACCIDENTS

Only Abstainers Will Be Selected for Promotion at the Joliet Works

From time to time reference has been made in these columns to the action taken by employers in the iron and steel and metal working industries against the use of intoxicants by employees. Below is a copy of a notice posted May 12 at one of the plants of the Illinois Steel Company. It is signed by E. J. Buffington, president of the company, and by D. R. Mathias, general superintendent of the Joliet works, and tells its own story of the stand taken by the management:

"To the Employees of Joliet Works,
Illinois Steel Company:

"For the promotion of safety and welfare it is hoped that all employees will avoid the use of intoxicating liquors.

"Under the rules of Joliet Works any employee who uses intoxicating liquor while on duty will be discharged.

"In making promotions in any departments of the plant, superintendents of departments and foremen will select for promotion only those who do not use intoxicating liquor."

"Sobriety First, Safety Follows"

Considerable interest was taken in a safety first exhibit held in the Central Y. M. C. A. in Cleveland during the week ending May 24, in behalf of the "Back with the Saloon" movement. The exhibit was the same as that made at the International Exposition of Safety and Sanitation in New York City last December, but also included a number of additional charts, photographs, etc., showing the effect of drink and its relation to accidents. The keynote legend of the exhibit is "Sobriety First; Safety Follows." Thomas D. West, of Cleveland, chairman of the American Foundrymen's Association committee on the prevention of accidents in foundries, took an active part in the exhibit and started the circulation of petitions in behalf of the American Foundrymen's Association and other organizations asking the Ohio Legislature to prohibit the issuing of license for saloons to be located within 600 to 1000 ft. of a manufacturing plant and especially within that distance of plants where the work is more than ordinarily hazardous or where night work is done or where women are employed.

A Notable Meeting of Steel Manufacturers

Technical Papers of Unusual Merit, Comment on Business Conditions and a Striking Exhibit of Progress in Welfare Work

The American Iron and Steel Institute as a force in the country's steel industry becomes more impressive with every meeting. Nearly 500 representative men, or 40 per cent. of the membership, gathered at the Waldorf-Astoria, New York, on Friday, May 22, at the sixth of the Institute's general meetings. Conditions in the steel trade, that for some months have been baffling to the prophets, helped to swell the attendance, for the Institute has grown to be a great clearing house of opinion on the business situation. This time this feature made a close race with the technical papers for the attention of the members, and never has there been a stronger programme on technical and commercial questions.

The Chicago meeting of last October came when the signs of business slackening, detected in spots earlier in the year, were thick enough to be commonly seen. Everybody in the industry wanted light on the future. The sentiment at the Chicago meeting was mixed; so much so that the general tone of the banquet speeches was interpreted by some who heard them to be favorable, while others construed them as expressing no little doubt about the future.

Judge Gary said in his Chicago address: "We have, perhaps, been more or less enveloped in clouds of doubt and distrust and hesitancy, but I think we are arriving at a better understanding; that we are approaching the dawn of the greatest prosperity." Something of a laugh was raised at the Waldorf on Friday morning when Judge Gary, referring to his Chicago speech in its prophetic aspect, said, "Well, gentlemen, don't forget that we are six months nearer the dawn."

Last week's Waldorf meeting came nearer than any of its predecessors to imitating the engineering societies in one respect. Time was when the membership sat almost as a body during the reading of all of the papers and discussions. This time, early in the forenoon session, a good many left their seats to join in the corridor parliament, and as the day wore on this latter could have mustered almost as large a force as sat in the convention hall. It is becoming evident that the convention committees are spreading too bountiful a feast in the papers and discussions. The programme might be shortened to advantage. At all events, the speakers might well be restricted to a smaller time allowance.

The morning and afternoon sessions were held in the Astor Gallery and in adjoining rooms and corridors. The members began gathering an hour before the formal opening for the customary exchange of views and the promotion of acquaintance. There was further mingling after the morning session, when a buffet lunch was served.

President Gary on the Situation

The address of Judge Gary in opening the meetings has become an institution. It has been looked to as sounding a timely note concerning business. On this occasion it was briefer than usual and bore lightly on the public matters that have been so long uppermost. But these were quite fully covered in the presidential addresses of 1913. After telling of the strength of the Institute, with its membership of more than 1200, and of its growing influence and its valuable papers, Judge Gary said:

In times of prosperity it is very easy for us to be generous in our treatment of all the questions which are presented to us for consideration and determination. In such times it is not difficult for us to be generous to our employees and to one another. If our mills are running at full capacity, our earnings large, and our balances in the bank entirely satisfactory, it is natural for us to pay large wages and to deal kindly with each other, avoiding anything that is unfair, giving every opportunity to inspect our mills and to know what we are doing to secure the greatest economies, in fact, permitting each other to know the names of our customers and even the bookings which we have. There have been times when this generosity has been shown by those who are connected with this great industry in a marked degree. But when the orders on our books are small, the prices low, and the demand much below capacity to supply, we are all more or less inclined to be selfish. Possibly some of us are forced to do everything we can to secure orders and to take care of our own interests, regardless of the rights and interests of our competitors in business, and also sometimes without regard to our obligations to our employees.

THE BUSINESS OUTLOOK

Without intending to emphasize the conditions which obtain at the present time I would be less than frank and truthful if I failed to admit that business is not as good as we would like to have it. I would like to say just what is in my mind concerning this subject, but perhaps it is unnecessary. I said six months ago at our semi-annual meeting that in my opinion we were approaching the dawn of prosperity. Well, gentlemen, don't forget that we are six months nearer the dawn.

But in times like these, I ask you to consider not only the propriety, but the necessity, and more than that, the pleasure, of being fair, reasonable and generous in our treatment of our employees and our treatment of one another. It is not necessary at this time to speak of being generous to our customers, for they are taking care of themselves. But it is necessary to be very considerate of each other, and it is not only our duty, as members of a fraternity who have established a reputation for fair and honorable dealing, to be very careful not to do anything that is unjust toward each other, but it pays in dollars and cents to pursue that course. There is no one man or company so capable, intellectually or otherwise, that he or it can afford to ignore the rights of others. I am dealing in generalities and without any intention to refer to any individual or any company. We are all on the same basis. We are all trying to take care of ourselves but we should all, at the same time, have a disposition to try and help one another.

THE FAVORABLE FACTORS

There are some favorable things to be considered. In the first place, as is our habit, we point to the crops

of the year. They are something that cannot be taken away from us, even by the politicians. Crops are growing. We are going to have an abundance this year, and they will have their influence on the business conditions of this country. We shall see improvement. This country is just as big as it ever was; it is growing just as fast. It is rich and it is bound to be prosperous. Depressions are temporary. If we are careful of our business, if we husband our resources, if we have patience, courage, persistence, we will come out in the end all right.

A FAIRER DEAL FOR BUSINESS

But there is another thing I believe more important. As I read the signs of the day, there is a well developed sentiment throughout this country in favor of giving business—even big business—a fair chance. The man in office or the man accepting candidacy for office, who will have the disposition and the courage to stand up and declare that it is time for the people of this country to realize there can be no real happiness or comfort or prosperity except on a foundation of material growth and prosperity, if he is fortified by a reputation for ability and honesty, will be most popular. I believe that the tendency which has been shown against business, which has perhaps had its influence, is radically changing. I have no disposition to minimize the efforts of any man who talks of moral growth and moral strength; nevertheless that, without material prosperity, will be unavailing, and I believe we shall soon see much better conditions, including even the legislation of the country.

The Technical Sessions

In the papers and discussions of the day those dealing with "Modern American Blast Furnace Practice" and "Heat Treatment in the Steel Wire Industry" attracted particular attention, the former because it brought up to date an important department of iron and steel works practice and the latter because it was the first public description of certain features of the production of high grade wire. The turbine is not new in engineering discussions, but the presentation of the subject on Friday was particularly interesting as dealing with very recent progress. The same can be said of the paper and discussion on by-product coke ovens, these being in a sense a sequel of the voluminous paper and discussion on this subject one year ago. The commercial side of the business was represented by a paper dealing with the investment factor in sales policy and another on transportation. Below is given the morning and afternoon programme as carried out:

FIRST SESSION, 10 A. M.

Modern American Blast Furnace Practice, by Hermann A. Brassert, Superintendent blast furnaces, Illinois Steel Company, South Chicago, Ill.

Discussion by John N. Reese, general superintendent Northern furnaces, Republic Iron & Steel Company, Youngstown, Ohio.

Discussion by Arthur J. Boynton, superintendent blast furnaces, National Tube Company, Lorain, Ohio.

Discussion by Richard V. McKay, superintendent blast furnaces, Pennsylvania Steel Company, Steelton, Pa.

Discussion by Edgar S. Cook, president Warwick Iron Company, Pottstown, Pa.

The Importance of the Investment Factor in Sales Policy, by Thomas J. Bray, president Republic Iron & Steel Company, Youngstown, Ohio.

Discussion by C. Snelling Robinson, second vice-president Youngstown Sheet & Tube Company, Youngstown, Ohio.

Discussion by Harry D. Westfall, vice-president LaBelle Iron Works, Steubenville, Ohio.

SECOND SESSION, 2 P. M.

The Practical Importance of Heat Treatments in the Steel Wire Industry, by John F. Tinsley, superintendent South Works American Steel & Wire Company, Worcester, Mass.

Discussion by James W. Smith, factory manager Wyman & Gordon Company, Worcester, Mass.

Transportation, by J. Fred Townsend, traffic manager National Tube Company, Pittsburgh.

Discussion by Delos W. Cooke, vice-president and general traffic manager Erie Railroad Company, New York.

Discussion by Thomas O. Cole, traffic manager Bethlehem Steel Company, South Bethlehem, Pa.

Recent Progress in the Building of Large Steam Turbines, by Francis Hodgkinson, engineer Westinghouse Machine Company, East Pittsburgh, Pa.

Discussion by Henry G. Stott, superintendent motor power Interborough Rapid Transit Company, New York.

Some Recent Developments in By-Product Coke Ovens, by William H. Blauvelt, consulting engineer Semet-Solvay Company, Syracuse, N. Y.

Discussion by Carl A. Meissner, chairman Coke Committee United States Steel Corporation, New York.

Some of the above papers and discussions are presented in this issue; others are carried over and will appear in the next two or three weeks. It was planned to have an open discussion of all papers under a five-minute rule, but the set programme was so long that volunteer discussion was impossible.

It has been noticed at every meeting of the Institute that some speakers show little or no ability to make their voices carry. In one or two conspicuous cases on Friday the effect of what was read was greatly enhanced by strong tones and clear enunciation. The first paper of the afternoon is an example.

The annual meeting of the board of directors of the Institute was held at the noon recess The officers were re-elected as follows:

President, Elbert H. Gary;
First Vice-President, Powell Stackhouse;
Second Vice-President, Willis L. King;
Third Vice-President, Charles M. Schwab;
Treasurer, Edward Bailey;
Secretary, James T. McCleary.

A number of persons were elected to membership. Their names will be found elsewhere.

The Dinner Speeches

The attendance at the Institute dinner in the evening was again gratifying, alike in personnel and number. In the words of the president, the associations growing out of such a gathering were more than ever an occasion for congratulation. The same restraint in comment and prophecy that marked the meetings of the day was again dominant. The demonstrative good fellowship so prominent at the Chicago dinner six months before was less in evidence. In its place there was reflected a sympathetic understanding that the trying conditions business is now called upon to face, must be borne with philosophic patience.

Welfare Work Up to Date

The address of the evening was an eloquent and striking review of the "Present Scope of Welfare Work in the Iron and Steel Industry," by Dr. Thomas Darlington. To those who have not followed closely what the great steel companies are doing to promote not only the present comfort but the future interest of their employees and employees' families, this address and the views that accompanied it brought out vividly a new element in the progressive spirit of the industry which is little short of epochal. This welfare campaign has gone far beyond the economic proposal to do what will redound to the pecuniary benefit of the employer by reason of the employee's increased efficiency. The desire to improve the lot of the employee plainly lies behind the work that is being done. It would seem clear that the great employers in the industry now recognize in their relationship to their employees an obligation to promote the welfare of the

latter, and in meeting this obligation they are working with enthusiasm.

A NEW ERA

Dr. Darlington's address was made striking by its excellent screen views. These illustrated the improvement of water supply, better methods for the disposition of refuse and garbage, radical changes in toilet facilities, fundamental improvements in housing conditions and the development of gardens and pleasant home surroundings. The work has gone on at mines, at blast furnaces, at mills and throughout communities. Organized staffs for the instruction of women in their homes in the care of the house and of children; courses in housekeeping, cooking, manual training for the boys, and facilities for play and exercise both indoors and out—all have demonstrated their value and necessity in raising the moral, mental and physical tone of the employee.

Impressive as is this evidence of what employers have done voluntarily, more important are the signs of a response by employees to these efforts in their behalf. There is now real ground for satisfaction in the results of this altruism and already the public at large is appreciating the new spirit of the industry, while those at the Friday night dinner keenly realized that no other organization has more clearly and effectively put its hand to the plow in the field of welfare endeavor.

As Dr. Darlington finished amid applause Judge Gary commented: "What a refutation of the oftentimes expressed idea that you are living only for the accumulation of dollars!"

A discussion of Dr. Darlington's address by Dr. Sidney McCurdy, chief surgeon of the Youngstown Sheet & Tube Company, emphasized to what extent the facilities now installed at most of the larger mills for first aid and for general health precautions enter into the essentials of present day industry. The importance of these things, he clearly pointed out, can no longer be neglected.

Speeches More or Less Impromptu

Referring to the customary part of the dinner's programme which is given to impromptu speeches, at which time it has been the practice to call upon the presidents of leading companies, Judge Gary said that the Committee of Arrangements had named a number of men, to hear whom there are ordinarily fewer opportunities. President Farrell of the United States Steel Corporation was first called upon to convey to the American Iron and Steel Institute the greeting he had brought from the (British) Iron and Steel Institute. Mr. Farrell had just returned from London, where he attended the Institute meetings early in May and he spoke of the cordial relations between the leaders of industry on both sides of the ocean as represented by his reception in London and the expressions of good will and respect which he was asked to convey on his return.

CANADA AND RAW MATERIALS

Judge Gary then called upon J. H. Plummer as representing the iron and steel industry of Canada. Mr. Plummer paid tribute to the great progress the industry had made in the United States. Canada, he said, is but following afar off. And yet there is coming for the United States a time when the increasing leanness of raw materials will bring about a situation such as Germany has had to contend with and such as Canada has continuously encountered. Then the trying experience Canadians have had in securing results from the raw materials available to them will enable them to help the United States when the richness of its resources no longer place its iron and steel practice in a class so unique.

PERILS OF THE TIN PLATE INDUSTRY

William U. Follansbee of the Follansbee Sheet & Tin Plate Company, Pittsburgh, was much appreciated for his humor on the disadvantages of his own situation. On arising a whispered comment had reached his ear calling him a "poor devil." "My friend must have known that I am in the tin plate business and that since the revision of the tariff, tin plate imports have increased only 1400 per cent. It must also have been known that I am a manufacturer of sheets, for I note by the last issues of the trade papers that the sheet line is the weakest of all. I am further convinced of the peculiar misfortune of my position, when I recall that after averaging up recently the profit on all of our business over a period we found that it amounted to about $2 a car. The next day we were served with a notice from the Pennsylvania Lines West that we must in the future pay a spotting charge; and that wipes out all that remained of our poor profit!" Mr. Follansbee said that in the face of this combination of circumstances he was about to migrate to Detroit to seek a job at a minimum of $5 a day, when he saw in the paper that the Ford Motor Company was reported to be laying off 6000 men. "There is but one industry in this country," he concluded, "which is working over-time and that is the conversation factory at Washington." It is also a strange coincidence, in his opinion, that prosperity growing out of that flow of language has come to a man named Underwood, a manufacturer of typewriters.

INDIA HAS ITS TROUBLES

A very interesting message from the Tata Iron & Steel Company in India was brought to the Institute by Charles P. Perin. Mr. Perin related in a humorous vein some of the difficulties with which his company has to contend, with labor, with transportation and with various unusual experiences of pioneering, and he assured the members of the Institute that their troubles were not the only ones in the world. He intimated that under the new tariff imports of rails from the India plant were to be expected on the Pacific coast.

THE SINS OF THE SALES DEPARTMENT

Frank Baackes, vice-president and general sales manager of the American Steel & Wire Company, drove a sharp prod of self-criticism into the thought of the evening. Nothing had been more striking to him during the day, he said, than the evidence of progress shown in the manufacturing end of industry, as indicated by the papers read and the contrast with the lack of progress by the commercial end. Every time business suffers a depression the commercial end loses its head. In his opinion no possible reason can be produced which requires the selling of a product without a profit. "It is a strange thing that we believe what the man we are going to sell tells us rather than ourselves. We seem unable to remember that whatever our friendly relations may be with our customers, it is the nature of the man who buys to make his best friend work for him for nothing." In times of depression, Mr. Baackes continued, the evidence is unmistakable that the men representing the commercial department do not know enough to stand by their own price but consider that they must sell at the price of the other fellow. "Let us of the commercial end of the business, upon whom rests the obligation to make money, as distinguished from the manufacturing department's obligation to

make goods, show that we know how to make a dollar as well as our associates know how to make steel. Let us hope that we shall have sense enough not to load up the industry at present prices when business begins to improve."

James H. Hoyt followed. In gentle sarcasm, using the thoughts, co-operation, prudence and optimism, brought out earlier in the day by Judge Gary, he told how, in times like these, all three are specially needed. His criticism was largely directed against those who are now responsible for legislation and he ventured the opinion that the pendulum is already returning to a state of mind among the people where they will insist that business be given a fair show. The kind of optimism needed is that of the man suffering from St. Vitus dance, who was extremely grateful that he did not also have rheumatism. Mr. Hoyt called attention to a shifting in the balance of trade since the new tariff has been in effect, amounting to $114,000,000, from a favorable balance to a debit. He spoke of an acquaintance who was highly elated at the lower duties he paid on personal apparel brought from England, but who was rudely awakened to the fact that his income tax left him little net profit after all.

NIAGARA OPPORTUNITIES

Hugh Kennedy, of the Rogers-Brown Iron Company, Buffalo, very interestingly told of the "vision" which had made the frontier centering around Buffalo one of wonderful attraction. The sixty million horse power that is being harnessed at Niagara Falls and the many channels of activity which that natural advantage has opened up, the great development of the concrete industry, the wonderful improvement in transportation by canal and the continuous facilities for conveying grain—all these, he pointed out, in a happy narrative with something of a Jules Verne touch, are associated in the natural opportunity that lies in the district between Lake Erie and Lake Ontario.

BUSINESS BEHIND THE DAM

George M. Verity, president of the American Rolling Mill Company, Middletown, Ohio, had in his mind two thoughts. He likened the present obstruction to the natural flow of business to a dam across a river. Behind it there is continually piling up a flood of accumulating needs like the great forebay of an irrigation project which will eventually overflow the dam and may perhaps come with such a rush as to sweep it entirely away. He also suggested that the Institute is an organization which might most happily use its influence to bring about more uniform and stable labor conditions. He did not attempt to outline methods, but stated that there is imperative need in the interest of the employee as well as the employer that the unscrupulous labor leader of to-day be deposed and that the employee be brought to understand that there is a direct relationship between him and his employer through which the best interests of both may be conserved.

HOPEFULNESS AT THE LAST

Recommending a patient and careful conservation of strength until the time of returning prosperity, Severn P. Ker, president of the Sharon Steel Hoop Company, Sharon, Pa., expressed briefly the thought in the minds of many, and he added the hope that the necessities of the present trying times might not impel too great a sacrifice of profits until business should revive.

By popular request Charles M. Schwab, Willis King and James A. Campbell were called upon. Mr. Schwab stated that he felt the pessimistic atmosphere of the meeting so strongly that he was almost inclined himself to be pessimistic in spite of his natural optimism. Though forced to admit that the state of business is bad, he was still an optimist and to that story he proposed to stick.

In closing Judge Gary again emphasized the need of being careful of each other's welfare. That which is done even for a competitor must of necessity return again in like measure or greater. "We have," he said, "more than hope for the future; we have expectation and the assurance that prosperity cannot be held in check forever."

Members in Attendance

The following are the names of members in attendance at the meeting. In a few cases the names are given of persons who had signified their intention of attending but who did not register at the secretary's desk. An increasing proportion of younger members was noticeable.

F. E. Abbott, O. J. Abell, R. L. Ahles, E. M. Allen, James P. Allen, Edwin A. Amaden, Jay I. Andrews, M. Cochrane Armour, Eliot Armstrong, Christopher G. Atwater.

Frank Baackes, C. J. Bacon, Edward Bailey, William M. Bailey, W. H. Baldridge, H. G. Baldwin, W. R. Balsinger, A. F. Banks, H. H. Barbour, H. A. Barren, A. H. Beale, George H. Beaumont, C. W. Bennett, F. T. Bentley, John J. Bever, W. H. Blauvelt, Ernst Boley, James B. Bonner, Roland H. Boutwell, L. H. Bowman, A. J. Boynton, J. W. Brainard, D. L. Braine, L. W. Braine, H. S. Braman, H. A. Brassert, William Breeden, Henry N. Brinsmade, Robert E. Brooke, J. J. Brooks, Jr., De Courcey Browne, C. A. Buck, R. B. Budd, C. E. Buek, Eugene J. Buffington, W. P. Burdick, F. A. Burr, James Burry, D. Fairfax Bush, C. M. Booth, R. P. Bowler, H. D. Bush, Joseph G. Butler, Jr.

J. M. Camp, J. A. Campbell, L. J. Campbell, P. E. Carhart, R. B. Carnahan, R. B. Carr, David B. Carse, John B. Carse, Waddill Catchings, Hiram S. Chamberlain, S. H. Chauvenet, M. G. Christie, Eugene B. Clark, John B. Clark, R. W. Clark, E. A. S. Clarke, Thomas C. Clarke, H. G. Clopper, Charles L. Close, Charles C. Cluff, T. B. Coles, Frederick Connell, Edgar S. Cook, H. H. Cook, D. W. Cooke, P. T. Coons, G. M. Cooper, William T. Corbett, Frank Cordes, Harry Coulby, George A. Craigin, E. R. Crawford, George G. Crawford, W. D. Crawford, M. Jackson Crispin, H. W. Croft, Alfred Crook, S. H. Crummings, W. C. Cuntz, Frederick Crabtree, W. E. Corne, D. T. Croxton, Theron I. Crane.

C. I. Dailey, George Damerel, Thomas Darlington, John M. Davidson, George C. Davies, Charles C. Davis, Henry J. Davis, R. J. Davis, W. O. Davis, William T. Dean, Omar S. Decker, Joseph G. Deericks, A. T. DeForest, Fred C. Deming, William Dette, Thomas Devlin, Bradley Dewey, A. N. Diehl, L. A. Dietrich, Lorenzo C. Dilks, A. H. Dillon, A. W. Dodd, W. H. Donner, J. W. Dougherty, Trusten P. Draper, Daniel J. Driscoll, John Duncan, Herbert Du Puy, Philip S. Dyer, H. F. Devens.

Richard H. Edmonds, J. H. Edwards, J. S. Elverson, D. Eppelsheimer, Jr.

James A. Farrell, W. H. Farrell, W. P. Fedder, Edgar C. Felton, William A. Field, W. J. Filbert, A. I. Findley, J. B. Finley, F. F. Fitzpatrick, Berthold Floersheim, William U. Follansbee, W. A. Forbes, A. A. Fowler, L. W. Francis, Isaac W. Frank, H. A. Fuller, Willard Fuller, E. Nick Fremont.

Fred E. Gage, J. E. Galvin, Elbert H. Gary, Emil Gathmann, James Gayley, Robert Geddis, Frederick C. Gedge, Roland Gerry, W. P. Gleason, Thomas K. Glenn, F. H. Gordon, Peter J. Gordon, E. G. Grace, Charles J. Graham, J. H. Gray, L. J. Gray, Wm. G. Gray, W. B. Gresham, E. S. Griffiths, Justice Grugan.

S. E. Hackett, Edward M. Hagar, G. A. Hagar, Francis J. Hall, R. S. Hall, John W. Hamilton, James H. Hammond, M. A. Hanna, N. V. Hansell, W. A. Harris, Joseph Hartshorne, Joshua A. Hatfield, A. Heckscher, A. H. Helander, G. W. Hewitt, Charles N. Hickok, H. E. Higgins, W. T. Hildrup, Jr., William H. Hill, F. H. Hirschland, Robert Hobson, Francis Hodgkinson, C. O. Holmes, W. S. Horner, Otis E. Hovey, F. P. Howe, Henry M. Howe, H. P. Howell, Elton Hoyt, 2d, J. H. Hoyt, P. H. Hubbard, H. L. Hughes, I. Lamont Hughes, John Hughes, Charles S. Hurd, A. F. Huston, O. N. Hutchinson, W. E. Hyatt.

F. Ingraham, R. L. Ireland, Robert H. Irons, Phillips Isham, Edward L. Ives.

Henry L. James, Alexander Jarecki, John C. Jay, Jr., Robert E. Jennings, William E. Jewell, George W. Jewett, Frank H. Johnson, J. E. Johnson, Jr., Lewis Johnson, A. Johnston, C. T. Johnston, Evan F. Jones, Harry R. Jones, Henry L. Jones, G. E. Junius.

John W. Kagarise, J. S. Keefe, Frank G. Kennedy, Jr., Hugh Kennedy, J. J. Kennedy, T. W. Kennedy, D. G. Kerr, F. A. Keyes, Willis L. King, B. G. Klugh, Morris Knowles, L. L. Knox, Heinrich Koppers, J. W. Kreitter, J. E. Kreps, S. P. Ker.

R. P. Lamont, Frank J. Lanahan, Edward A. Langenbach, J. K. Larkin, Emil Larsson, L. Lee, George K. Leet, William A. Leonard, J. B. Lessig, J. E. Lewis, Eugene Guy Lilly, James Lippincott, Frederick B. Lovepoy, C. E. Lozier, R. R. Luckie, William W. Lukens, L. C. Lustenberger.

Duncan MacDonald, A. F. Mack, Charles Major, S. T. Major, W. E. Manning, C. D. Marshall, C. S. Marshall, S. M. Marshall, Amasa Stone Mather, S. L. Mather, John A. Mathews, David S. Mathias, John H. McAlarney, Elmer T. McCleary, J. T. McCleary, S. L. McCormick, Archibald M. McCrea, Dr. Sidney McCurdy, C. B. McElhany, C. L. McGowan, Edward M. McIlvain, George F. McKay, Richard V. McKay, Arthur G. McKee, W. C. McKee, A. G. McKenna, William McLaughlin, John McLeod, R. E. McMahon, Max McMurray, Geo. G. McMurtry, J. W. Meaker, Carl A. Meissner, Robert J. Mercur, W. F. Meredith, D. A. Merriman, George Mesta, Frederick Meyers, C. D. S. Miller, C. F. Huston Miller, George E. Molleson, A. F. Morris, L. B. Morris, John B. Moss, E. W. Mudge, Alfred H. Mulliken, Thomas Murray, W. H. Morgan.

L. F. Nagle, A. L. Nash, H. P. Nash, M. A. Neeland, P. A. Newton, Robert W. Ney, Benjamin Nicoll, George W. Niedringhaus, C. F. Niemann, Frank H. Nullmeyer.

Edward O'Toole, G. A. Orrock.

William R. Palmer, William P. Palmer, E. W. Pargny, R. L. Parrish, A. C. Parsons, Leonard Peckitt, John A. Penton, C. P. Perin, W. B. Perley, Richard Peters, Jr., N. Petinot, John O. Pew, W. S. Pilling, J. H. Plummer, Charles E. Pope, W. S. Potter, R. H. Pratt, G. A. Prendergast, Veryl Preston.

B. D. Quarrie, Charles F. Quincy.

Walter Rachals, Robert Radford, Joseph S. Ralston, Charles F. Rand, John N. Reese, David Reeves, Samuel J. Reeves, G. A. Reinhardt, J. L. Reploge, J. V. W. Reynders, F. B. Richards, Frank C. Roberts, Alexander P. Robinson, C. S. Robinson, Cyrus Robinson, T. W. Robinson, James P. Roe, Lewis P. Ross, Wallace H. Rowe, Louis Ruhl, J. A. Ruiloba, Henry B. Rust, W. F. Rust, E. L. Ryerson, Jr., John Reis, W. C. Reilly.

G. A. St. Clair, Frank Samuel, William D. Sargent, Charles E. Satler, Albert Sauveur, H. D. Savage, W. B. Schiller, W. F. Schleiter, John C. Schmidt, Dez. C. Sconthal, W. Schuster, Charles M. Schwab, George C. Scott, Kenneth Seaver, G. W. Sells, J. H. Sheadle, J. Norman Sherer, Wm. O'Neill Sherman, George S. Shimer, MacGilvray Shiras, George W. Short, B. R. Shover, John M. Sias, James Sim, Thomas W. Simpers, E. E. Slick, C. C. Smith, J. W. Smith, H. S. Snyder, W. E. Snyder, W. P. Snyder, Jr., Harrison Souder, Henry H. Stambaugh, John Stambaugh, W. A. Stanton, C. J. Clark, Edward B. Stearns, R. C. Steese, Charles G. Stevens, H. L. Stevens, A. A. Stevenson, J. S. Stillman, E. E. Stone, George C. Stone, Charles R. Sturdevant, George M. Sullivan, W. J. Sullivan, Max M. Suppes, R. H. Sweetser, M. J. Scammell.

B. H. Taylor, Knox Taylor, T. H. Taylor, Wade A. Taylor, Charles S. Thomas, E. P. Thomas, Leon E. Thomas, W. A. Thomas, A. W. Thompson, George G. Thorp, J. Earlston Thropp, Jr., George Timmins, John F. Tinsley, John A. Topping, J. Fred Townsend.

John S. Unger.

George M. Verity, C. A. Vogt, Felix A. Vogel.

J. D. Waddell, J. E. Wadsworth, J. C. Walker, William H. Walker, W. R. Walker, James C. Wallace, James H. Ward, G. B. Waterhouse, John J. Watson, R. Wayland-Smith, F. J. Webb, Wm. R. Webster, C. M. Weld, R. G. Wells, Carl A. Wendell, Arthur West, H. D. Westfall, Andrew Wheeler, C. V. Wheeler, Seymour Wheeler, George A. White, George S. Whyte, H. S. Wilkinson, H. D. Williams, Frank A. Wilmot, Louis Wilputte, Elmer E. Winckler, F. S. Witherbee, William Lloyd Wolfe, Richard G. Wood, L. A. Woodard, John E. Woods, Leonard G. Woods, E. H. Worth, W. P. Worth, P. E. Wright, W. L. Wright, F. B. Williams.

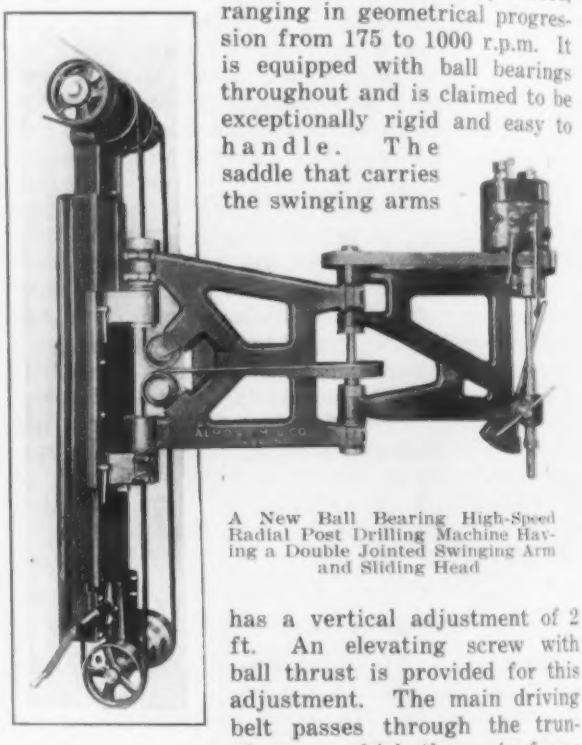
Place of Next Meeting

The choice of the city in which the October meeting of the Institute will be held will be made at the directors' meeting on the fourth Friday in June. Birmingham and Youngstown have been suggested. If hotel facilities are found to be ample, Birmingham is favored by a large number of members, though Youngstown manufacturers have rather strongly urged their city.

A Post Type of Radial Drilling Machine

A new ball bearing high-speed radial post drilling machine has been brought out by the Almond Mfg. Company, Cleveland, Ohio. The most important distinctive feature of this tool, which is claimed to give it a decided advantage over the standard type of radial drilling machine with swinging arm and sliding head, is that it has a double or jointed swinging arm so that the drill can be brought directly to the proper position with a single motion, thus greatly increasing the speed of operation.

The machine is designed for light drilling and tapping operations. It has a drilling radius of 4 ft. and will handle up to ⅞-in. drills and ¾-in. standard taps. The machine is entirely self-contained and may be driven directly from the lineshaft or by an individual constant-speed motor. Six changes of spindle speed are provided, ranging in geometrical progression from 175 to 1000 r.p.m. It is equipped with ball bearings throughout and is claimed to be exceptionally rigid and easy to handle. The saddle that carries the swinging arms



A New Ball Bearing High-Speed Radial Post Drilling Machine Having a Double Jointed Swinging Arm and Sliding Head

has a vertical adjustment of 2 ft. An elevating screw with ball thrust is provided for this adjustment. The main driving belt passes through the trunnions on which the main frame swings, so that the belt tension and alignment are not affected by the swinging of the arm or by the vertical adjustment. Provision is made on the machine for maintaining tension of the driving belts. The weight of the swinging frame is taken on ball thrust collars and provision is made at the trunnions for taking up any wear.

The geared tapping attachment is an interesting feature of the machine. When the spindle is running on any of the three open belt speeds obtained by the three-step cone pulley the reversing gears are not running and are automatically locked out of engagement. When the tapping attachment is thrown into operation the spindle speed is reduced to one-third of the open belt speed with a quick reverse of approximately 2 to 1. Owing to the fact that the belt speed is not reduced this arrangement is said to give ample power as well as proper speeds for large drilling, reaming, counterboring and stud setting, in addition to tapping. The change from drilling speed to tapping speed is made while the machine is running by the operating levers shown on the side of the head.

The hand feed lever has a ratchet adjustment and has a counterbalance attached to it. This counterbalance supports the weight of the spindle and tools and will always return the lever into a position convenient for the operator.

NEW PATTERNMAKER'S MACHINE

A Combination of a Disk Grinding and a Roll Sanding Machine Into One Unit

A combination machine incorporating both the disk grinding wheel and the sanding roll in one unit has been placed on the market by the Gardner Machine Company, Beloit, Wis. It is equipped with the universal work table and the gauges that are provided by the builder in its standard line of grinding machine.

The grinding wheel is 30 in. in diameter and runs at a speed of 950 r.p.m. The universal work table, which is a special feature of the machine, is mounted on a dovetail slide back of the cutting plane of the wheel. It can be raised or lowered and locked at any desired hight instantly. A weight within the machine base counterbalances the table and is relied upon to enable this operation to be performed easily. An angular adjustment to the face of the disk wheel is provided for the table, the exact degree of angularity being indicated by a graduated segment at the head of the table. The table top is locked in the desired position by turning a handwheel. The axis of the table is located so that the inner edge always remains close to the disk irrespective of the angularity of the table. It is pointed out that this feature will be found advantageous in working on small pieces. Three work gauges, the universal angle, the duplicating and the circle generating gauge, are included in equipment of the table. These enable compound angles, parallel surfaces, round work and external curves to be turned out rapidly.

A Recently Developed Combination Patternma ker's Machine Which Incorporates the Disk Grinding Wheel and the Sanding Roll in One Unit

The sanding roll end of the machine is designed for generating and finishing internal curves that have been roughly cut out on a bandsaw and the work handled is usually performed by handcarving and on lathes. Four different diameters of rolls which have a common length of 7 in. are furnished and a friction disk drive is employed which gives a variation in the speed of the roll spindle of from 2000 to 6000 r.p.m. The rolls are made of cast aluminum and are faced with a strip of garnet which is cut at an angle to give a spiral seam from end to end of the roll, an arrangement which is relied upon to prevent any pounding that would result with a straight joint. One of the special features of the roll is that it has a reciprocating motion of ⅛ in. which prevents the cutting of ridges or grooves in the work and also assists in removing the stock. This motion is secured by making the spindle engage with a pivoted fork with a ball bearing support that works over a cam, the drive being by helical steel gears. Ball bearings are employed to support the entire weight of the spindle and the roll. It is pointed out that angles can be finished as accurately and rapidly as straight surfaces by the roll end of the machine. This is accomplished by tilting the roll rather than by changing the table top which always remains flat irrespective of the angle at which the operator may be working. The angle at which the roll is tilted is indicated on a graduated segment located directly behind the locking handwheel. If the main spindle which carries the disk wheel is in operation the sanding roll can be started or stopped as occasion requires by a clutch lever located at the center of the front of the machine.

A dust hood is provided for the disk wheel, and it is pointed out that the amount of dust thrown in the air by the sanding wheel is so small that no exhaust arrangement is ordinarily required. The grindings are practically all laid out on the top of the table and can be easily brushed aside, although if desired an exhaust pipe with enlarged opening can be suspended directly above the roll to take care of the dust.

The machine can be driven either by belt or a direct-connected motor. If motor drive is employed the motor is mounted on a bracket at the rear of the machine base and connected to the main driving spindle by a silent chain. The complete equipment furnished with the machine includes a 30-in. disk wheel, three universal work gauges, countershaft, four sanding rolls, a supply of garnet disks and sanding strips, cement, grease, wrenches, etc. The floor space required is approximately 6 x 12 ft., and the weight of the machine is 3000 lb.

The Healy Tool & Appliance Company, recently incorporated, has taken over and reorganized the business of the company of the same name at Brocton, N. Y., and has located its factory and offices at 62 and 64 Pearl street, Buffalo. It will manufacture the Healy valve reseater and its accompanying tools, valve grinders, valve stem reamers, valve spring compressors, etc., all pertaining to valves of gas motors. N. B. Healy is president and U. L. Candell secretary and treasurer of the new company.

Modern American Blast Furnace Practice

Theory, Construction and Operation Covered at Length by Hermann A. Brassert Before the American Iron and Steel Institute

For reference and record the paper "Modern American Blast Furnace Practice," read before the American Iron and Steel Institute, New York, May 22, by Hermann A. Brassert,* taken with the several discussions bearing upon it, will be found the most complete statement of our contemporary blast furnace practice available. Its value lies not alone in the monumental completeness with which details have been considered, but in the happy association of function with mechanism which gives to the paper a logical clearness too seldom found. Necessity compels here an abbreviation of the paper, but the plan is to print it in these columns in full.

THEORY

With less tractable raw materials, the problem of blast furnace practice has been to maintain the best results of the past in the face of greater handicaps. The paper confines itself largely to the smelting of fine ores. The success of a blast furnace operation is measured by: quality of product; rate of output, and economy of operation. The kind of practice that secures the one secures all, and the keynote is uniformity and heat concentration.

Improved furnace construction which now makes the granular ores more desirable in structure than the lumpy, mitigates some of the disadvantages of greater leanness. The introduction of sintered and nodulized ore into the burden also adds to the easy working of the fine ore. Ores high in alumina, formerly considered undesirable, are now smelted in quantity, particularly Cuban ores. Titaniferous ores now appear to offer like possibilities, but the pretreatment of silicious ores by washing seems permanently unavoidable in the face of a steadily increasing content.

The cost of beehive coke and the more limited quality of coal from which it can be made have contributed to the rapid extension of the by-product coking process. The combustibility of coke, dependent largely upon its porosity, is a prime factor in the working of a furnace.

The changed physical quality of ores now in use has added new specifications of desirability to limestone. Fines should be eliminated by screening and lumps avoided. The increase in silica and alumina in the ore has likewise affected the analysis requirements in the stone.

The attention that has been given to controlling the quality of the air blast goes back to the introduction of the iron pipe stove for heating, the firebrick stove, the Gayley dry blast method of promoting fuel economy and, most recently, the enrichment of the air with oxygen.

CONSTRUCTION

For the top of the blast furnace the simplest design which will give the required distribution is the most desirable, and it is to be remembered that many irregularities of stock distribution bear no relation to the design of the top. To prevent the channeling of gases is a first consideration, and in American practice the finer materials are distributed around the furnace walls, the coarser rolling toward the center, thus opening up the stock column.

Changing considerations have influenced the development of blast furnace lines in the period since the early eighties, and the paper presents these modifications and their history with outline sketches. Methods of cooling, the merits of thick and thin linings, have now been defined, and the importance of the quality of fire brick has secured greater appreciation.

OPERATION

To establish a low top temperature from the very first, the burden should be increased in advance of the wind. In this manner a new furnace can be made to carry the highest possible ratio of burden in the second week of operation. By gradually following with the wind volume and bringing higher blast heats into play, it is possible to maintain this heavy burden and reach a high production on a low fuel consumption with a comparatively small amount of wind blown.

The average blast temperature carried on furnaces burdened with Mesaba ores seldom exceeds 1100 deg. F., ranging far lower than the blast heats commonly applied in European practice, and also lower than on most of our Eastern furnaces using magnetic ores. To permit high heat being carried and the furnace to work freely with a low melting zone, the slag must be kept uniformly acid. Once the melting process is carried too high up, the original bosh line is raised, the brick work above the bosh wears back, the bosh becomes too high, and any attempt to again lower the zone of fusion by the application of high heats and increased burden results in irregular operation by suspending the unmelted stock on the previously formed angle. This is why high heats cannot generally be used on a worn lining. With the unavoidable variations in raw materials, it is easier to operate on lower blast heats a lighter burden, and with richer gases, because of the greater margin of safety with plenty of heat held in reserve. The use of very high heats requires constant watchfulness, and any slight change in the furnace must be quickly perceived and counteracted.

The smelting of fine ores has led to the effort to deliver a constant weight of oxygen to the furnace at all times. Where the Gayley dry blast is used, this is accomplished simply by maintaining a uniform speed of the blowing engines. Turbo blowers can be governed by a regulating device in the air inlet which automatically delivers a constant weight of air but without a correction for varying moistures. Reciprocating engines running on natural air can be made to deliver a constant weight of oxygen by varying the revolutions according to atmospheric changes. To derive the benefit of lower temperature and moisture the air should be drawn from the outside of the engine room.

Blast furnace operations become intricate when frequent changes from one grade of iron to another are required. Without good furnace lines it is

*Superintendent of blast furnaces, Illinois Steel Company, South Chicago, Ill.

impossible to vary the grades without loss of quality and economy.

In blowing out, the temperature of the escaping gases should be kept so low as not to cause any damage to the furnace top. This is accomplished by spraying water on the bell and the descending stock, and gradually decreasing the wind volume. Accumulations on the walls of stack and bosh should be cleaned off in the process of blowing out by using an acid slag and short tuyeres. A suitable quantity of fine materials, such as boiler ashes or granulated cinder, charged on top of the final rounds of burden, will keep the blast pressure sufficiently high, even when the stock line approaches the tuyere level, to allow most of the iron and slag to be lifted out of the hearth during the last cast. This applies only to American practice where the tapping hole slants downward. The danger of gas explosions is avoided by filling the gas flues with steam before any air is allowed to enter.

The unwarranted prolongation of furnace campaigns on worn-out lines is often a source of enormous losses in the manufacture of iron, and one which seems to be frequently overlooked in the effort to achieve a large production on a lining. It is poor policy to set a standard tonnage for a campaign, since one of 300,000 tons may be more destructive to the furnace walls than another of twice that tonnage. The economy of practice alone should determine the end of the furnace campaign.

Suitable hearth construction has decreased the daily number of casts. At the South Works three casts per day is the rule, 150 to 200 tons and more being tapped at a time. It is quite possible that in the future, with further enlargement of the crucible, no casts will have to be made on the night turn. Big ladles and mixers of large capacity are indispensable in this development. The latter have the further advantage of eliminating the most objectionable and wasteful part of blast furnace operations—the casting in sand beds or pig machines and the remelting of a considerable portion of the product. In Germany some plants today have a sufficient mixer capacity to hold all the Sunday iron for direct conversion.

THE HUMAN ELEMENT

The furnace manager who fails to devote as much of his thought and energy to studying and improving his organization as he gives to correcting the design of his plant, misses one of his best opportunities. He should not hide his practice but should display the daily, weekly and monthly results in all their details, so that his men will derive a better understanding of their work. By also giving them the opportunity to study rival plants, the incentive to greater effort is further stimulated.

Furnace Slags, Stock Distribution and Hot Stove Possibilities

BY A. J. BOYNTON

Superintendent Blast Furnaces, National Tube Company, Lorain, Ohio.

In the past few years a very prominent part of the effort toward greater efficiency at steel works furnaces has been in attempted use of acid slags and higher blast temperatures. These two features of practice are related, not merely because the one cannot be used to the fullest extent without the other, but also because they increase the fuel efficiency of the furnace in the same way, the hot blast by increasing the combustion temperature of the gases in the furnace, and the acid slag by decreasing the temperature necessary for the operations of the hearth. The advantage of hot blast is not altogether and perhaps not chiefly in the heat which it carries into the furnace, but in the combustion temperature which it produces. That the effect of increase in the difference between combustion temperature of gases and melting point of slag is much greater than that due to the amount of heat carried in by the blast has been clearly pointed out as a reason for the effectiveness of both hot blast and dry blast. Similarly the economy of acid slags is not determined entirely by the quantity of heat required to melt the slag, but also by the temperature of melting.

DISADVANTAGES OF BASIC SLAG

Increase in coke consumption and the corresponding decrease in tonnage does not, however, by any means represent the sum total of the disadvantage of running with basic slag. Such a slag carries too little silica to absorb the lime present in the region of the top of the bosh. The lime is consequently rejected by the slag at this point and some of it remains as the chief cause of scaffolds on the bosh. The serious consequences of the formation of these scaffolds are well understood, and include irregular iron, excessive production of flue dust and interrupted operation.

The requirements for the use of acid slags and high blast temperature are not easily fulfilled. They include correct furnace lines, uniformity of raw materials, as the furnace heavily burdened and running on an acid slag is extremely sensitive to variations in the charge, low sulphur content in the coke, correct distribution, and stove equipment to generate the temperature required. It is seldom that all of these requirements are fulfilled. Consequently, in many cases where the use of acid slags and high heats has been attempted, no consistent increase in burden was possible, and the results have been chiefly noticeable in iron alternately too hot and too cold, and in the presence of scouring slags, together with an undue wearing of the lining through the elevation of the temperature at any given level inside the furnace.

SULPHUR HOLDING CAPACITY OF SLAGS

Mr. Brassert has spoken in detail of the development of furnace lines and the necessity of uniformity in raw materials, and has also stated that the volume and basicity of slags are generally determined by the duty of sulphur elimination. The ability of any slag to remove sulphur at any given hearth temperature depends on its basicity, which is generally taken to be the ratio between the sum of the lime and magnesia and the silica. Any attempt to classify the sulphur holding capacity of the slag in accordance with the sum of the silica and alumina is likely to show confusing results where there is much variation in the alumina.

A comparison of Bessemer slags made at Lorain, covering 120 furnace months, shows a gradual increase in sulphur content as the basicity increases. The most acid slag carries 1.64 per cent. sulphur, and the most basic over 2 per cent. The slags range from 37 per cent. to 32½ per cent. silica,

and from 1.2 to 1.5 ratio of bases to silica. The unit taken is the average composition of the slag from one furnace for one month.

The advantage of running on the more acid slag is indicated by the coke practice corresponding to these averages, the average coke consumption for 20 months with the most acid slag being 1922 lb. per ton, and for 15 months with the most basic slag 2269 lb. per ton.

Where a consistent removal of sulphur is specified, few of our blast furnace plants have been in a position to avail themselves of the advantage of acid slag on account of the amount of sulphur in the charge, almost all of which is contained in the coke. With an ore supply containing 7½ per cent. silica and 2000 lb. of average Connellsville coke the normal slag volume is a little over 900 lb. per ton of iron. With an acid slag capable of carrying not over 1.64 per cent. sulphur at the temperature of the Bessemer hearth, the limit of sulphur in the coke for the normal slag volume is ⅞ per cent.

INCREASING BASICITY OR VOLUME OF SLAG

At the hearth temperature of a furnace making basic pig iron, with the same kind of slag, where the silicon is determined by the hearth temperature, the sulphur content of the slag will be about 1.2 per cent. This sulphur capacity in the slag requires sulphur in the coke below 0.6 per cent. for the normal slag volume. Any increase in sulphur in the coke above these points must be met in one of two ways, either by increasing the basicity of the slag or by increasing its volume.

With a sulphur in the coke of 1 per cent., the additional slag required would be 300 lb. in Bessemer practice and 700 lb. in basic. A voluntary increase in slag volume to the amount of this latter figure would probably be considered very poor business, the additional cost for the three principal items of increased coke, increased limestone and increased operating cost due to lessened tonnage amounting to about 67 cents per ton of iron, all of which can be more or less accurately calculated, while the losses due to running on basic slags cannot be calculated with any certainty. The fact that the blast furnaceman is required to choose between these evils emphasizes the importance of determining the cost of coal washing and its application wherever practicable, as well as the maintenance of constant sulphur in any grade of coke, by a local grading similar in principle to that done in the case of our ores.

REFINEMENTS IN DISTRIBUTING THE CHARGE

Uniform movement of the charge can only take place with perfect stock distribution. Any other distribution will result in a movement which may be steady on one side and intermittent on the opposite side, resulting in more or less of a vertical sharing of the charge which is a most usual cause of excessive flue dust. The fact that good practice under favorable conditions has been made with a distribution that is not perfect is not, in my judgment, a good reason for neglecting the utmost possible refinement in distributing the charge. This refinement should include, in the case of skip filled furnaces, the experimental determination of the best possible proportions of receiving hopper and throat, and of the position, angle and speed of dumping of the skip car; the removal of all obstructions to the flow of stock, such as crossheads for supporting the main bell, and lifting and holding lugs cast on its surface; a sufficient slope, probably not less than 50 deg. for the main bell, and the machining of its entire surface; the absolute centering and alignment of every part of the charging machinery with the furnace; the governing of extent and speed of travel of the bells, and the rotation of the charge in the throat.

STOVE DESIGN FOR HIGHER BLAST TEMPERATURES

The prospect of working with leaner ores and higher slag volumes makes it seem probable that an increase beyond the highest temperatures now regularly used may be expected, since it is generally true that in districts where lean ores have to be smelted the average blast temperature is much higher than it has been in the district using Lake ores. The question of stove capacity and design is, therefore, of much interest.

The average stove capacity of our furnaces 21 ft. 6 in. and over in bosh diameter is about 175,000 sq. ft. of heating surface, distributed in almost every case among four stoves. These stoves are generally of the two-pass side combustion or three-pass type. The consideration which has governed the size of these stoves has been primarily ability to get the temperature desired, seldom over 1200 deg., even for short periods of time. The details have been governed largely by considerations of structural strength and facility of cleaning. Most of the two-pass stoves are built with 9-in. checker openings and 3-in. walls. The three-pass stoves generally have 4-in. walls and an average size of checkers not less than those of the two-pass stoves. Aside from the question of cleaning, and with the object of gaining as large heating surface as possible inside a given shell, the thickness of the checker walls should be as small as strength will permit, and the openings the same diameter as the checkers. With 3-in. walls, a reduction in the diameter of the opening from 9 in. to 6 in. will increase the surface about 18 per cent. and a reduction to 4 in. about 30 per cent. With a 2½-in. wall and 4-in. openings the increase in surface is over 51 per cent. By changing their size it is therefore possible where washed gas is available to make a very considerable increase in the capacity of the stove without increasing the radiating surface of the shell, and this fact forms one of the strongest arguments for the use of washed gas for stoves. With unwashed gas the percentage of increase of surface which it is practicable to make is relatively small, since 6 in. in diameter of opening is generally considered the smallest advisable.

Aside from increase in surface there are other advantages of small checkers, due to the changed ratios of surface to volume, which result in much greater intimacy of contact between the air or gas and the brick work, and a much better economy in a stove of any given hight. A lower limit of 3 in. in the thickness of the checker walls, and 4 in. in diameter of opening will barely enable the small 21 x 100 ft. two-pass stoves to reach the present capacity of the larger three-pass stoves, four of which run a little below 200,000 sq. ft., and any increase above this figure will require additional hight or a fifth stove. The capacity of the 22 x 100 ft. three-pass stoves can be increased over 30 per cent. by the use of 3-in. walls and smaller openings.

A recent description of a German method of forcing the air for combustion of gas into the stoves, and the consequent ability to run the furnace with two stoves, one on air and one on gas, has attracted some attention in this country. Comparison shows, however, that the four stoves in question which were operating on a furnace making 168 tons of iron per day were as large as the stoves of some American furnaces making 500 tons per day and that with only half this equipment in use

(Continued on page 1360.)

MANUFACTURERS' MEETING

Conclusion of Proceedings of Convention of National Association of Manufacturers

In last week's issue of *The Iron Age* a report was given of the proceedings of the first day of the annual meeting of the National Association of Manufacturers at the Waldorf-Astoria, New York, on Tuesday, May 19. The second and final day was crowded with matters of interest.

ANTI-TRUST BILLS DENOUNCED

James A. Emery, general counsel for the association, made a stirring address on "The Legislative Situation." He attacked the Administration anti-trust programme as unnecessary and undesirable, because it tends to eliminate all reasonable standards in the conduct of interstate trade and commerce. He characterized such legislation as "anti-business" rather than "anti-trust." He protested against the proposal to legalize picketing by labor unions. Continuing, he said: "The proposed Clayton anti-trust bill is seriously objectionable because it threatens the introduction of new terms and new standards into the Sherman act, which, after 24 years of adjudication, approaches definite terms.

As showing the sentiment of the assembled manufacturers the following vigorous declaration was unanimously adopted:

Hostility to business must stop. With feelings of profound anxiety we observe prevailing industrial and commercial depression wholly at variance with those healthy and prosperous conditions to which our country is entitled. On all sides productive industry and operative manufacture are shrinking in volume and output to a degree that forebodes years of slow recovery before prosperity can be restored. We observe policies framed with experimental novelty with respect to the tested principles of the Sherman anti-trust act.

We witness with amazement hostility toward established and legitimate business from many sources—journalistic, legislative and even administrative; but we fail to detect any concerted and affirmative efforts to resuscitate business vitality or augment those great industrial forces that should express the sovereignty of our trade and commerce. The number of unemployed American workingmen, now hundreds of thousands, is increasing. Countless plants and factories operate listlessly on greatly reduced schedules. A hesitancy, born of relentless political onslaught and ruthless legislative assault, explains in large part our business inertia.

Therefore Be It Resolved: That the National Association of Manufacturers, a non-political, non-partisan organization, representing all crafts and groups of industry, does hereby solemnly protest against continuous assault on our established industries. That we affirm our conviction that unless there is a cessation of hostility to legitimate business the vitality of our commerce and trade will be critically impaired.

And we therefore finally resolve: That we unqualifiedly oppose the passage of the Clayton bill (H. R. bill 15,657), now pending before Congress.

OTHER ACTION TAKEN

The association reaffirmed its condemnation of the "closed" or union shop principle or agreements of such description, and in other resolutions proffered by the committee on union label strongly discouraged the use of the union label by manufacturers. The chief point made in this connection was that the label seems to imply a standard character in the product so marked; but the committee contended that many of such products are of poor quality and therefore the label tends to mislead the public.

On the subject of immigration the association held, through the adoption of a committee report, that the "illiteracy test" as applied does not work satisfactorily, and that the term "anarchist" in the law should be made broad enough to include all aliens who advocate the destruction of property or those who indulge in malicious destruction of property whether they accept the programme of sabotage or not. The report of the committee on bankruptcy approved the existing law.

Resolutions were also adopted favoring the recommendation of the committee on patents, advocating the creation of a court of patent appeals and the erection of a new patent office suitable and safe for the conduct of that department of the Government. The pending bill in the House of Representatives known as the Oldfield design registration bill, to provide legal protection for the original designs for manufactured products, was also indorsed.

Another resolution urged that in bills establishing Government aid for industrial education it should be provided that institutions should not be aided for that purpose until they should satisfy a Government commission that they had attained and were maintaining a certain standard. In this connection the industrial department of the Y. M. C. A. was praised.

Numerous short addresses were made on a variety of subjects by prominent members. Theodore C. Search, of Philadelphia, a past president, received an ovation and delivered an interesting speech. A considerable part of the afternoon session was devoted to foreign trade matters. C. J. Medzikhovsky, commercial attaché to the Imperial Russian Embassy at Washington, D. C., addressed the convention on the existing trade relations between Russia and the United States. He deprecated the abrogation of the commercial treaty between his country and ours.

C. E. MacPherson, chief of the Russian trade division of the association's foreign trade department, explained at length the prevailing industrial and financial conditions in Russia, citing opportunities for American manufacturers and exporters to obtain orders for their products. Manuel Gonzalez Zeledon, consul general for Costa Rica in New York, delivered an interesting address on "Central America as a Field for the American Manufacturer."

THE BANQUET

Ludwig Nissen of New York City was toastmaster at the banquet held in the Waldorf-Astoria on Wednesday evening, in which over 300 participated, representing all sections of the country. A novel feature was the singing at frequent intervals by a splendid chorus of male voices belonging to the Manufacturers' Club of Bridgeport, Conn. Among the speakers were Hon. Curtis Guild, ex-Governor of Massachusetts and ex-Ambassador to Russia, whose subject was "The Modernization of the Diplomatic Service," and Charles F. Mathewson, counsel for the United States Chamber of Commerce, who spoke on "Business and Legislation." Mr. Guild severely criticised the policy pursued by the Federal Government for many years in "starving the State Department" by refusing to make more than small provisions for its financial support. Mr. Mathewson defended the right of the business interests of the nation to support both morally and financially those whom they favored to serve in the legislative halls.

At a meeting of the executive committee, on Thursday, Col. George Pope, Pope Mfg. Company, Hartford, Conn., was re-elected president of the association. Other officers were also re-elected as follows: George S. Boudinot, secretary; J. B. Bird, general manager; A. B. See, A. B. See Electric Elevator Company, New York City, treasurer. A vice-president was elected for each State.

A Steel Manufacturer on Profit Sharing

George M. Verity, president of the American Rolling Mill Company, Middletown, Ohio, addressed the Cincinnati Business Men's Club at the noonday luncheon on May 19 on "Industrial Unrest and Some Suggestions for Remedy." He traversed the causes of the great dissatisfaction found in all classes of labor today and suggested among remedies honest journalism, honest politics, more practical cooperation between all classes and all interests, better working and living conditions, increased respect for property rights and the establishment of real community interest in industry through an equitable sharing of profits. He held that profit sharing must be on the basis of reward for loyal and efficient service and a prize for extra effort. Profit sharing alone, he said, cannot be successfully used as an antidote for labor troubles where unsatisfactory labor conditions exist. It is an influence to be used for further development where labor conditions are already sound and where an employer has taken care of the fundamental things due labor under modern conditions. Profit sharing is an extra incentive and an additional reward for the best effort a man can put forth who has already made good to an employer who has his confidence and good will.

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Steel Men on the Outlook

No small factor in the work of the American Iron and Steel Institute is the opportunity its meetings give for getting at the opinions of leaders in the industry on the state of trade. The 500 men who met in New York last week represented some hundreds of millions of capital and the pick of American brains as applied to the manufacture and sale of steel products. Studying the faces at this meeting, one had first the thought of the power of such a body. And then, considering the doubt and timidity now widely affecting business, the second thought was of the comparative impotence of these leading figures in a great industry to set the country forward on the road to prosperity. It is not necessary to go into the reasons for the present incapacity of the steel giant; they have been too many times reiterated.

Those who journeyed to New York last week set no small store on what would develop from the sifting of views on the trade outlook. The usual keynote address of President Gary and the thorough threshing out of the situation as man met man were expected to throw some light on the future. But the results were disappointing. President Gary carefully refrained from prophecy, and beyond a reference to the splendid crop promised his chief comment on the outlook was that the dawn of a new prosperity was six months nearer than when he had predicted it at the Chicago meeting of last fall. Mr. Farrell, just returned from Europe, did not attempt a definite estimate of the immediate future. With consistent optimism, he looked for a revival in business not only in Europe but at home and referred to indications that "business throughout the world is gradually emerging from an unsatisfactory condition to one in which commercial confidence is being re-established."

The expressions of scores of important men in the industry who attended the meeting were as much question as opinion, perhaps more. Most of them had never found the conditions more baffling to prediction. It was common to say that some railroad buying, perhaps considerable, would follow the rate decision of a few weeks hence, and that as a great crop had always meant large business in iron and steel, the extraordinary crop prospect of this year would be heard from some months later. There were allusions also to the indications of changing sentiment on the trust and tariff issues, which could be better measured when the results of the Congressional elections are known.

As to the course of the steel market in the remainder of the year, some variations of opinion appeared. It is pretty well agreed that low prices will be seen through most if not all the second half. Whether the next buying movement would be a broad one, with long-time contracts at $1 to $2 a ton below the recent level—like those of the late months of 1911—or something like the minor movement of last January, taking care of but a few months ahead, is a matter of diverse opinion. In the view of some it will be a long time before the good prices of late 1912 and early 1913 are seen again. There was substantial agreement in the belief that the second half of this year will show somewhat larger volume than the first half and that 1915 will be a better year than 1914, both in tonnage and profits.

There is no disguising the opinion that the Underwood tariff will be a repressing influence in the American steel trade, except in times of full occupation of European capacity in its ordinary outlets. European steel mills are now controlling much of our Pacific coast trade and still larger imports there are to be expected. On the Eastern and Southern seaboards German and Belgian agencies have been established in recent months, in preparation for larger trade here when improvement comes. Such operations will keep American prices from rising to the levels that in the past have been required to compensate our steel makers for lean years and that will be just as necessary in the future to yield earnings sufficient for renewals and new construction.

Industrial Railroads Have Rights

One of the dreams of the Interstate Commerce Commission has been dissipated. In its beatific contemplation of apparently unlimited powers, the commission had a vision of an important reform to be accomplished through the severance of business relations between the railroad companies and the small tap lines or plant railroads owned by industrial establishments. The division with these roads of charges on traffic received or delivered is an old practice which originated when some industrial companies had become sufficiently important to require miles of yard tracks and several locomotives to serve their plants, and in the course of time spread to a great variety of industries throughout the country. In smelling for nefarious practices by business men, some bright genius, in the commission or out of it, dreamed that the allowance of any part of the freight charges on such interchanging traffic was practically a rebate to the owner of the plant. Proceeding on that assumption, the Interstate Commerce Commission spent months of time

on an investigation of industrial roads, accumulated great volumes of testimony, and finally promulgated an order that such allowances should be discontinued. Since the agitation of this question began it has steadily assumed more and more importance, and statisticians connected with the commission have sharpened their pencils, and, after much figuring, have decided that the aggregate runs up into so many million dollars that the abrogation of these allowances would save the railroad companies almost if not quite enough money to avoid the necessity of making a general increase in their freight rates for the purpose of securing much needed revenue.

The United States Supreme Court has rudely dispelled this expectation. A decision handed down on Monday in an almost forgotten case says that "the commission exceeded its authority when it condemned these roads [tap lines] as a mere attempt to evade the law and secure rebates and preferences for themselves." The principle is cited that "the extent to which a railroad is in fact used does not determine the fact whether it is or is not a common carrier; it is the right of the public to use the road's facilities and to demand use of it rather than the extent of its business which is the real criterion determinative of its character." While the decision may not be broad enough to cover all industrial roads, it is the opinion of good lawyers that it will apply to most of them.

The decision, however, does not go so far as to permit that divisions of joint rates may be made at the will of the carriers involved and without any authority of the commission to control them, saying "that body has the authority and it is its duty to reach all unlawful discriminatory practices resulting in favoritism and unfair advantages to particular shippers or carriers" and "if the divisions of joint rates are such as to amount to rebates or discriminations in favor of the owners of the tap lines because of their disproportionate amount in view of the service rendered, it is within the province of the commission to reduce the amount so that the tap line shall receive just compensation only for what it actually does."

This decision must commend itself to everybody as being eminently fair and thoroughly sensible. The industrial railroads supplement the service of the railroad companies with which they connect and perform a function which has a practical value in enabling such railroad companies to handle their business with dispatch. Manufacturers who make such improvements in connection with their plants are clearly entitled to some return on the investment thus made. It is for the Interstate Commerce Commission to decide whether the compensation allowed is fair or excessive. If the commission, however, makes a ruling which is unsatisfactory to the parties involved they still have recourse to the courts for the determination of this question. It is well that this decision has been made at this time as the Interstate Commerce Commission now has its way cleared for the plain, straight settlement of the question as to whether or not the Eastern railroads are entitled to a full 5 per cent. advance on their present freight rates. It is to be hoped that the commission will have no more dreams, but will wake up and attend strictly to the business intrusted in its keeping.

International Tin-Plate Competition

The Welsh tin-plate makers are engaged in a serious effort to lower their cost of production for the purpose of meeting American competition more fully. They have found it impossible to meet the competition of American mills in the American "rebate" trade and in the Canadian market when the American mills were particularly anxious for business.

In this effort to reduce the cost of production, it is frankly admitted that American methods are being followed. Several mills have been built in Wales with machinery approaching in strength that developed in American practice, but thus far the benefits therefrom are not obtained because the Welsh Artisans' United Association refuses to accept the modification in the wage scale which the employers regard as necessary in order to obtain the benefits of modern American practice.

In substance the issue is this, that in both Wales and the United States there have been wage scales which called for the payment of a definite sum per unit of mill output—the gross ton in the United States and the dozen boxes in Wales—against each job, rolling, doubling, etc. In the United States the innovation began years ago of the men occasionally employing helpers, until at present the practice is quite general of nearly every job being split between two men. The rate per ton for the job remains the same, but the money is distributed to two men. By the output being increased, the earnings per individual have been maintained, and indeed it is strongly urged in some quarters that the men are considerably better paid, in proportion to effort expended, than was the case years ago when one man filled the whole job throughout the turn.

The attitude of the Welsh workmen as a body is that they will submit to the introduction of the new American practice, but they require an advance in the piece rate. They are unable to see, or unwilling to admit, that the number of men in the crew and the output per mill could be so increased that with the employers paying the present rates per dozen boxes the individual earnings of the men would at least not be decreased.

Before American competition became severe, matters in the Welsh tin-plate trade were easily regulated. Instead of the employers agreeing upon prices which would prove profitable, and then adhering to them, the men regulated the industry by calling strikes or stop weeks, thus regulating production so that profitable prices could be secured. With American competition established, such methods would naturally prove suicidal, and some 15 years ago the Tin Plate Conciliation Board was established. This board has regulated matters between employers and men quite well, there being practically no cessation of labor on account of disputes; but thus far it has been unable to bring the parties together in an amicable adjustment of the new problem, the introduction of the American system of working which is clearly a *sine qua non* for the new and heavier mills that are to meet American competition.

The present Welsh wages, it must be remembered, are much lower than the American, per unit of output. When the American mills have been

able to meet Welsh competition, it has been by reason partly of the improved machinery and methods of working, but very largely indeed by the integration of the American mills which at times compete with the Welsh mills, an integration which permits them to forego such portions of the profit upon ore mining, steel making, etc., as is necessary. The Welsh mills do not have this advantage of integration.

The great difference in mill practice between the United States and Wales which is now engaging the earnest attention of the Welsh manufacturers is of interesting significance, in that it discloses a difference which does not exist so largely in other branches of steel making. In the decade of the nineties, as is well recognized, American iron and steel practice advanced by leaps and bounds, easily distancing what was being done in England and on the European Continent. It was quite natural that in the tin-plate industry, which had its real inception in 1891 and 1892, there should be similar rapid progress. In more recent years the British and continental steel makers have made improvements more rapidly than formerly, so that at the present time there is not as great difference between their methods and appliances and our own as was the case some 15 years ago. In the manufacture of tin plate, however, the divergence is very wide. For this distinction, as may be gathered from the foregoing, the existence of a strong labor organization in the Welsh tin-plate trade is responsible. If a similar organization had controlled the American tin-plate trade, there would now be no improved American practice for the Welsh mills to seek to adopt. Had there been similar organizations in other branches of the steel trade abroad, their methods and appliances to-day would not be as nearly up to the American standard as they are.

The Interstate Trade Commission Bill

WASHINGTON, D. C., May 27, 1914.—The first definite legislative step in the execution of the Administration's programme for the control of big business has been taken by the House of Representatives, which in the Committee of the Whole has adopted the so-called Covington bill creating an Interstate Trade Commission to exercise a limited supervision over the transactions of large corporations. This is the first of the three measures to which the President and the majority leaders of Congress stand committed. The second, known as the Clayton omnibus anti-trust bill, which is intended to supplement the Sherman anti-trust law, is now under discussion in the Committee of the Whole, and will be followed by the third, known as the Rayburn bill, granting to the Interstate Commerce Commission the right to supervise all issues of new securities by common carriers. Under the programme agreed upon, these three bills are being considered in Committee of the Whole and it is expected that they will all reach the Senate within a week.

All phases of the question of trust control are now being considered by the Senate Committee on Interstate Commerce, which has drafted a tentative measure, known as the Newlands bill, in which are embraced provisions covering substantially the same field as that covered by the three House bills referred to. In detail, however, the Senate and House measures present many important differences, especially in the matter of the exemption of labor unions from the operation of the anti-trust laws, as the Senate committee thus far has framed no provision dealing with any form of exemptions.

The Interstate Trade Commission is to consist of three members, not more than two to be of the same political party. The commissioners will be paid $10,000 per annum and a secretary $5000. An adequate clerical force is authorized. All the powers at present exercised by the Bureau of Corporations are vested in the commission and the organization of the bureau is consolidated therewith.

The bill provides that every corporation engaged in commerce, except common carriers, having a capital of not less than $5,000,000, or, if having a less capital, belongs to a class of corporations which the commission may designate, shall furnish the commission annually "such information, statements and records of its organization, bondholders and stockholders, and financial condition, and also such information, statements and records of its relation to other corporations and its business and practices while engaged in commerce as the commission shall require," and the commission may prescribe as nearly as may be a uniform system of annual reports covering the fiscal year of each corporation, attested by oath and filed with the commission in Washington within three months after the close of the year covered by the report. The commission may also require such special reports as it may deem advisable. Failure to comply with these provisions renders the corporation liable to heavy fines. Upon the direction of the President, the Attorney General or either house of Congress, the commission is authorized to investigate and report the facts relating to any alleged violations of the anti-trust acts by any corporation, and such reports may include recommendations for readjustment of business "in order that the corporation investigated may thereafter maintain its organization, management, and conduct of business in accordance with law." Reports made after investigation may be made public in the discretion of the commission, and for the purpose of prosecuting any investigation ordered by the President, the Attorney General or Congress, the commission or its duly authorized agents "shall at all reasonable times have access to, for the purpose of examination, and the right to copy any documentary evidence of any corporation being investigated or proceeded against."

The commission is required to make an annual report on or before December 1 of each year, to be transmitted to Congress, covering the facts and statistics collected during the preceding year "as may be considered of value in the determination of questions connected with the conduct of commerce by corporations," including an abstract of the annual and special reports of corporations made to the commission, as provided by the bill. A proviso stipulates that "no trade secrets or private lists of customers shall be embraced in any such abstract."

The Covington bill as passed is a much more conservative measure than many of the majority members of the House desire to see placed on the statute books but is comprehensive enough to render the work of the commission obnoxiously inquisitorial in the hands of radical commissioners. The real usefulness to the business community of this new agency will depend largely upon the predilections of its members and the attitude of the Attorney General. W. L. C.

New York Subway Bids Opened

Bids were opened May 22 by the Public Service Commission for the construction of the new subway-system tunnels under the East River from the lower part of Manhattan to Brooklyn. Each of the two tunnels will consist of two tubes laid side by side, one for each track. They will be built under compressed air by the shield method and must be completed within three and one-half years of the date of the execution of the contract.

According to the unofficial figures the lowest offer came from Booth & Flinn, Ltd., and the O'Rourke Engineering Construction Company, bidding in partnership. They offered to construct both tunnels for $12,461,000, while the Holbrook, Cabot & Rollins Corporation was willing to construct both tunnels for $12,677,000. Other offers were received, but none came below $14,800,000 for the two tunnels, so they are not likely to be considered.

NEW STEEL INSTITUTE MEMBERS

Names Recently Added to the Active and Associate Lists

The following were elected members of the American Iron and Steel Institute at meetings of the board of directors held in May:

Active Members

Brooke Anderson, assistant department manager, American Steel & Wire Company, Chicago.

Frank P. Bassett, Pennsylvania Steel Company, Steelton, Pa.

Richard E. Bebb, president Massillon Rolling Mill Company, Massillon, Ohio.

John J. Beyer, manager foundry department, Otis Steel Company, Cleveland.

C. A. Buck, vice-president Bethlehem Steel Company, South Bethlehem, Pa.

Ralph W. Clark, head salesman, New York office, Rogers, Brown & Co., New York.

Alexander Fielder Clarke, manager Firth-Sterling Steel Company, McKeesport, Pa.

Dwight H. Coble, secretary H. C. Frick Coke Company, Pittsburgh.

W. E. Corne, sales manager American Steel & Wire Company, New York.

W. H. Davey, general manager Massillon Rolling Mill Company, Massillon, Ohio.

James C. Davis, fourth vice-president American Steel Foundries, Chicago.

Henry F. Devens, general sales manager Superior Steel Company, Carnegie, Pa.

Alfred W. Dodd, sales manager New Jersey Zinc Company, New York.

Frederick J. Griffiths, general superintendent Massillon Rolling Mill Company, Massillon, Ohio.

Edwin W. Harrison, vice-president Superior Steel Company, Philadelphia.

Harry T. Harrison, chief engineer, Corrigan, McKinney & Co., Cleveland.

Joseph F. Hedges, secretary and treasurer Superior Steel Company, Carnegie, Pa.

Walter L. Kauffman, credit manager Youngstown Sheet & Tube Company, Youngstown, O.

J. F. Lloyd, vice-president Weirton Steel Company, Weirton, W. Va.

John Hart McAlarney, salesman, United States Steel Products Company, New York.

Samuel L. McCormick, secretary Weirton Steel Company, Weirton, W. Va.

Richard Vincent McKay, superintendent blast furnaces, Pennsylvania Steel Company, Steelton, Pa.

W. C. McKee, general superintendent Thomas Iron Company, Easton, Pa.

John Alden Nichols, general superintendent Corrigan, McKinney & Co., Cleveland, O.

Dr. Lloyd Noland, superintendent health department, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

William R. Palmer, general superintendent American Tube & Stamping Company, Bridgeport, Conn.

John E. Perry, assistant to the president, Republic Iron & Steel Company, Youngstown, Ohio.

George P. Pilling, furnace manager, Standish, N. Y.

Gustav A. Reinhardt, Youngstown Sheet & Tube Company, Youngstown, Ohio.

A. W. Vogt, chief statistician, United States Steel Corporation, New York.

John J. Watson, general manager of sales, Phillips Sheet & Tin Plate Company, Weirton, W. Va.

John C. Williams, assistant to president, Phillips Sheet & Tin Plate Company, Weirton, W. Va.

Associate Members

Frederick C. Baird, freight traffic manager, Bessemer & Lake Erie Railroad Company, Pittsburgh.

Martin S. Baldwin, elevator manufacturer, Otis Elevator Company, New York.

Arthur P. Bowen, vice-president Pullman Company, Chicago.

Robert Pendleton Bowler, president Moa Bay Iron Company, New York.

Edward N. Breitung, iron ore, New York.

E. W. Christ, purchasing agent, Stanley Works, New Britain, Conn.

Benedict Crowell, chemist, Cleveland.

Eugene McF. Froment, New York.

Richard Frank Grant, general counsel M. A. Hanna & Co., Cleveland.

Morris Knowles, consulting engineer, Pittsburgh.

Christopher Minot Weld, New York.

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Montgomery Murray, president Keystone Bronze Company, Pittsburgh.

George A. Orrock, chief engineer of engineering department, New York Edison Company, New York.

Walter Rachals, Youngstown, Ohio.

William H. Ridgway, Craig Ridgway & Son Company, Coatesville, Pa.

Brent Wiley, commercial engineer, Westinghouse Electric & Mfg. Company, Pittsburgh.

Cyrus Robinson, president Metallurgical Engineering & Process Company, New York.

At the annual meeting of the Machinery Club of the City of New York held May 26, the following were elected to the board of governors to serve four years: J. R. Vandyck, Vandyck Churchill Company; W. H. Van Winkle, Water Works Equipment Company; Henry Prentiss Tool & Supply Company; J. A. Hill, Hill Publishing Company; H. L. Jones, United States Steel Corporation.

The American Tar Products Company, Chicago, has given three contracts to the H. Koppers Company to build tar-distilling plants; one at St. Louis, Mo., one at Youngstown, Ohio, and one at Birmingham, Ala.

The Iron and Metal Markets

CONSUMPTION LAGS

Figuring on Increased Imports

An Australian Rail Contract for 35,000 Tons—Further Buying of Basic Iron

The meeting of steel manufacturers in New York last week reflected scarcely so hopeful a feeling as has been shown in recent market reports. What was notable was the reserve of leaders in the trade in their expressions concerning the immediate future. It is generally predicted that the second half of the year will be better in tonnage than the first half, though not in prices.

In the steel trade new orders are still distinctly disappointing. Railroads show no sign of discounting the common belief as to the result of the rate case; it is definitely given out by some of them, in fact, that they will do nothing until after the decision. In the minds of steel manufacturers the crops are now figuring above all else.

The evident falling off in the business of manufacturing consumers of iron and steel is the outstanding fact in the situation. This is true of foundries and of metal working companies in a variety of lines.

Several interesting facts have come out as to foreign trade in iron and steel. Following the visit of its president to England, it is announced that the Steel Corporation has taken 35,000 tons of rails for Australia. On the other hand are a few items that indicate larger arrivals of foreign steel later in the year. A New England company that bought German basic Bessemer billets a few months ago, is figuring on several thousand tons more. There is also the prospect of importations of rails on the Pacific coast from the mill in India, which has a total freight of $6 to San Francisco against $11 from Pittsburgh to the coast. A considerable tonnage of German bars and angles is reported in transit to American jobbers' warehouses.

The cotton-tie situation is being watched closely by representatives of foreign makers, some of whom have already brought in stocks at New Orleans. Two domestic makers will not roll ties this year. The leading interest has not yet announced its price, though the market has often opened in April. Lately the South has been overrun with offers to sell foreign cotton ties at a certain amount under the American price when named.

The finished steel trade as a whole gives no indication of the fact that a good many contracts run out in another 30 days. This is not the case with agricultural machinery interests, as most of such companies have taken out less than two thirds of what they bought for the first half of the year. In some cases they will buy but little more until the size of the year's crops is assured. Farmers have been poor buyers of implements for a year and stocks are still large.

Structural mills have had better specifications from car works, bridge builders and jobbers in the past week, and there have been new orders for plates and shapes, reported at 50,000 tons, in connection with car contracts recently let. Shapes and bars are commonly sold at 1.12½c., Pittsburgh, with plates at 1.10c. In a few cases concessions of 50c. a ton have been made on shapes and bars. In the East two large buyers of plates have been sounding the market for the second half year.

The Seaboard Air Line's rail contracts, estimated at 17,000 tons, are about to be placed. In the Chicago district the rail buying of the week was about 10,000 tons. One company took an order for 52,000 pairs of splice bars and another rail joint contract amounted to 5000 tons.

The sheet market has been crowded down further, No. 28 galvanized going to 2.75c., while 1.80c. for black sheets has been shaded 50c. to $1 a ton.

The buying of basic pig iron has continued. An Ohio river contract calls for 10,000 tons, and an inquiry has come up from another Ohio river steel works. A Chicago sale of 3000 tons to a St. Louis steel foundry brings the total of the latter up to 24,000 tons, and a Chicago district steel works has bought 10,000 to 12,000 tons for the second half. Northern Ohio buying already reported was increased to 40,000 tons, all going to Cleveland.

Further concessions on foundry iron have been made in some quarters. At Buffalo sales were 15,000 to 20,000 tons. Eastern inquiry on the whole is less. The letting of the East River tunnel contract requiring 75,000 tons of cast iron segments was based on pig iron bids representing $1.20 a ton advance over to-day's market. Deliveries extend over two and a half years. There is keen competition for the segments and strenuous efforts to get lower pig iron bids on the final letting.

Coke prices are yielding. Some second half contracts are pending on which the recent early delivery basis of $1.75 to $1.85 is expected.

A Comparison of Prices

Advances Over the Previous Week In Heavy Type, Declines In Italics

At date, one week, one month, and one year previous

	May 27, 1914.	May 20, 1914.	Apr. 29, 1914.	May 28, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia..	$14.75	$14.75	$15.00	$16.50
No. 2, Valley furnace...	13.00	13.00	13.00	14.50
No. 2 Southern, Cin'ti...	13.75	13.75	13.75	14.75
No. 2, Birmingham, Ala.	10.50	10.50	10.50	11.50
No. 2, furnace, Chicago*	14.00	14.00	14.25	16.00
Basic, del'd, eastern Pa.	14.00	14.00	14.25	16.50
Basic, Valley furnace....	13.00	13.00	13.00	14.75
Besemer, Pittsburgh....	14.90	14.90	14.90	17.50
Malleable Bess., Ch'go*..	14.00	14.00	14.25	16.00
Gray forge, Pittsburgh..	13.65	13.65	13.65	14.90
L. S. charcoal, Chicago.	15.75	15.75	15.75	18.00
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh	20.00	20.00	20.00	26.50
O.-h. billets, Pittsburgh..	20.00	20.00	20.00	26.50
O.-h. sheet bars, P'gh...	21.00	21.00	21.00	27.00
Forging billets, base, P'gh.	25.00	25.00	25.00	34.00
O.-h. billets, Phila.....	22.40	22.40	22.40	28.00
Wire rods, Pittsburgh...	*24.50*	25.50	26.00	30.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	12.75	12.75	12.75	15.75
Iron rails, Philadelphia.	15.00	15.00	15.50	18.00
Carwheels, Chicago.....	11.50	11.50	11.50	14.25
Carwheels, Philadelphia.	11.75	11.75	12.00	13.50
Heavy steel scrap, P'gh.	11.50	11.50	11.50	13.00
Heavy steel scrap, Phila.	10.75	10.75	10.75	11.50
Heavy steel scrap, Ch'go	9.50	9.50	10.25	10.50
No. 1 cast, Pittsburgh..	11.50	11.50	11.50	13.25
No. 1 cast, Philadelphia.	12.00	12.00	13.00	13.50
No. 1 cast, Ch'go (net ton)	10.00	10.00	10.25	11.25
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess, rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	1.20	1.20	1.20	1.57½
Iron bars, Pittsburgh...	*1.25*	1.30	1.30	1.70
Iron bars, Chicago.....	1.10	1.10	1.10	1.57½
Steel bars, Pittsburgh...	*1.12½*	1.15	1.15	1.70
Steel bars, New York....	*1.28½*	1.31	1.31	1.88
Tank plates, Pittsburgh.	1.10	1.10	1.15	1.60
Tank plates, New York.	1.26	1.26	1.31	1.76
Beams, etc., Pittsburgh.	*1.12½*	1.15	1.15	1.50
Beams, etc., New York.	*1.28½*	1.31	1.31	1.68
Skelp, grooved steel, P'gh	1.20	1.20	1.20	1.45
Skelp, sheared steel, P'gh	1.25	1.25	1.25	1.50
Steel hoops, Pittsburgh..	1.25	1.25	1.25	1.60
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	1.85	1.85	1.90	2.30
Galv. sheets, No. 28, P'gh	*2.75*	2.80	2.85	3.40
Wire nails, Pittsburgh..	1.55	1.55	1.60	1.80
Cut nails, Pittsburgh....	1.60	1.60	1.65	1.70
Fence wire, base, P'gh...	1.35	1.35	1.40	1.60
Barb wire, galv., P'gh...	1.95	1.95	2.00	2.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

Per Net Ton at Oven:	May 27, 1914.	May 20, 1914.	Apr. 29, 1914.	May 28, 1913.
Furnace coke, prompt..	$1.75	$1.75	$1.85	$2.15
Furnace coke, future....	1.90	1.90	2.00	2.25
Foundry coke, prompt...	2.40	2.40	2.40	2.85
Foundry coke, future...	2.50	2.50	2.50	3.00

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	14.37½	14.37½	14.50	15.75
Electrolytic copper, N. Y.	14.12½	14.12½	14.12½	15.65
Spelter, St. Louis.....	4.95	5.00	4.85	5.25
Spelter, New York.....	5.10	5.15	5.00	5.40
Lead, St. Louis.....	3.80	3.80	3.80	4.20
Lead, New York.....	3.90	3.90	3.90	4.35
Tin, New York.....	33.25	33.00	34.60	48.75
Antimony, Hallett's, N. Y.	6.80	6.85	6.75	8.20
Tin plate, 100-lb. box, P'gh.	$3.30	$3.30	$3.30	$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c. to 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in....	.10
Gauges under 3-16 in. to and including No. 8....	.15
Gauges under No. 8 to and including No. 9....	.25
Gauges under No. 9 to and including No. 10...	.30
Gauges under No. 10 to and including No. 12...	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.12½c. to 1.15c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs.	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909....	.70
Tees, structural sizes (except elevator, hand rail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.35; galvanized, $1.75. Galvanized barb wire and fence staples to jobbers, $1.95; painted, $1.55. Wire nails to jobbers, $1.55. Woven wire fencing, 73½ per cent. off list for carloads; 72½ off for 1000-rod lots; 71½ off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	2.00	2.00	2.05	2.10	2.20	2.30	2.70	2.80

Wire Rods.—Bessemer, open-hearth and chain rods, $24.50 to $25.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from April 20, 1914, and iron pipe from June 2, 1913, all full weight:

Butt Weld

Steel. Inches	Black	Galv.	Iron. Inches	Black	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	66½	⅜	65	46
¾ to 3	80	71½	½	69	56
			¾ to 2½	72	61

Lap Weld

2	77	68½	1¼	56	45
2½ to 6	79	70½	1½	67	56
7 to 12	76	65½	2	68	58
13 to 15	53	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt	78	69½	1 to 1½, butt	70	59
2, lap	75	66½	2, butt	70	59
2½ to 6, lap	77	68½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	68	57½	⅜	63	52
½	73	66½	½	67	60
¾ to 1½	77	70½	¾ to 1½	71	62
2 to 3	78	71½	2 and 2½	72	63

Lap Weld, extra strong, plain ends

2	74	65½	1½	65	59
2½ to 4	76	67½	2	66	58
4½ to 6	75	66½	2½ to 4	70	61
7 to 8	68	57½	4½ to 6	69	60
9 to 12	62	52½	7 to 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	63	56½	½	57	49
¾ to 1½	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends

2	64	57½	2	55	49
2½ to 4	66	59½	2½ to 4	60	54
4½ to 6	65	58½	4½ to 6	59	53
7 to 8	58	47½	7 to 8	52	42

To the large jobbing trade an additional 5 and 2½ per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.	49
2½ to 2¾ in.	65	2¼ in.	45
3 and 3¼ in.	70	2½ to 2¾ in.	54
3½ to 4½ in.	72	3 and 3¼ in.	57
5 and 6 in.	65	3½ to 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.30
Nos. 9 to 10	1.35
Nos. 11 and 12	1.40
Nos. 13 and 14	1.45
Nos. 15 and 16	1.55

Box Annealed Sheets, Cold Rolled

Nos. 10 and 11	1.50 to 1.55
No. 12	1.50 to 1.55
Nos. 13 and 14	1.55 to 1.60
Nos. 15 and 16	1.60 to 1.65
Nos. 17 to 21	1.65 to 1.70
Nos. 22 and 24	1.70 to 1.75
Nos. 25 and 26	1.75 to 1.80
No. 27	1.80 to 1.85
No. 28	1.85 to 1.90
No. 29	1.90 to 1.95
No. 30	2.00 to 2.05

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.75 to 1.85
No. 12	1.85 to 1.95
Nos. 13 and 14	1.85 to 1.95
Nos. 15 and 16	2.00 to 2.10
Nos. 17 to 21	2.15 to 2.25
Nos. 22 and 24	2.30 to 2.40
Nos. 25 and 26	2.45 to 2.55
No. 27	2.60 to 2.70
No. 28	2.75 to 2.85
No. 29	2.90 to 3.00
No. 30	3.05 to 3.15

Pittsburgh

PITTSBURGH, PA., May 26, 1914.

While sentiment in the market is more favorable, as yet it is not manifested to even small extent in any actual increase in orders. There has been no betterment in mill operations, which are generally between 50 and 60 per cent., and with some are under 50 per cent. Prices have not taken on any stronger tone, but on some lines of finished material are slightly weaker. Steel bars and structural shapes are more commonly quoted at 1.12½c., while nearly all mills are naming 1.10c. on desirable orders for ¼-in. and heavier plates. The low prices of spelter, together with the light demand for galvanized sheets, are shown in a further weakening in prices of the latter, most mills now naming 2.75c. on No. 28 for desirable orders. The feeling prevails that there will be a good buying movement in June, and possibly some little recovery in prices, but the majority in the trade does not look for any permanent betterment before October. The local market for pig iron and semi-finished steel is almost lifeless in regard to new buying, and orders for finished iron and steel are still of a hand-to-mouth nature. On some lines of finished material, notably sheets, jobbers and consumers are willing to contract through second half at present low prices, but the mills are not willing to sell beyond third quarter. Coke and scrap are dull and neglected, with prices weak.

Pig Iron.—Practically nothing is doing in the local market. The American Steel Foundries is still figuring on 5000 to 10,000 tons of basic for its Alliance and Sharon works. A local sanitary ware interest has bought 1000 tons of No. 2 foundry on the basis of $13 or under, Valley furnace. In the absence of sales we quote Bessemer iron nominally at $14; basic, $13; No. 2 foundry, $13 to $13.50; gray forge, $12.75, and malleable Bessemer, $13 to $13.25, all at Valley furnace, the freight to Pittsburgh and Cleveland being 90c. a ton.

Billets and Sheet Bars.—No new business in steel is coming out to test prices, which are still nominally $20 for Bessemer and open-hearth billets and $21 for sheet bars, Pittsburgh or Youngstown mills. Nearly all consumers have contracts on which prices are arranged monthly or quarterly, and in most cases these consumers are getting their steel at less than the above prices. We quote Bessemer and open-hearth billets at $20, and Bessemer and open-hearth sheet bars at $21, f.o.b. makers' mills, Pittsburgh or Youngstown, for May and June delivery; forging billets, $25 on desirable specifications, embracing only one size, and up to but not including 10 x 10 in., the regular extras being charged for larger sizes. On small orders forging billets are held at $26. We quote axle billets at $23 for desirable orders and $24 for small orders.

Muck Bar.—In the absence of actual sales, we quote best grades of muck bar made from all pig iron at nominally $27, Pittsburgh. The Amalgamated Association is asking an increase of 75c. a ton over the present boiling rate for the year commencing July 1.

Ferroalloys.—Some inquiry is coming out for small lots of ferromanganese for prompt delivery on which $38, Baltimore, is quoted, but the market is not strong at this figure. The freight from Baltimore to Pittsburgh is $2.16 per ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $19; 11 per cent., $20, and 12 per cent., $21, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Structural Material.—Local fabricating interests report no important contracts closed during the week. The Massillon Bridge & Structural Company, Massillon, Ohio, has taken 1050 tons for new steel buildings for the National Enameling Company, Massillon. A fair amount of new work is being figured on, but it is slow in coming out. It is said that new work is going at such low prices that fabricators have little or no profit. Prices on structural shapes are weaker, and we quote beams and channels up to 15 in. at 1.12½c. to 1.15c., f.o.b. Pittsburgh.

Tin Plate.—Specifications against contracts for the domestic trade in the past three or four weeks have not been very active, but mills are still running on specifications placed in March and early April. Leading mills are running practically full. There is little new business, as consumers are covered for about all the tin plate they will need this year. On small lots we quote 100-lb. 14 x 20 coke plates at $3.30 to $3.40, and 100-lb. 14 x 20 terne plates, $3.20 to $3.30, Pittsburgh.

Sheets.—Jobbers and consumers of sheets are now anxious to place contracts for third quarter and last half of the year at the present low prices ruling for black and galvanized, but most of the mills are averse to selling for long delivery at present prices, and are trying as far as possible to restrict deliveries to 30 to 60 days from date of order. In some cases, contracts for No. 28 black sheets have been made for third quarter at 1.80c. to 1.85c., and on No. 28 galvanized at 2.75c. to 2.80c. The minimum of the market on No. 28 black sheets is 1.80c., but some mills are quoting 1.85c. and one leading interest, 1.90c. We quote Nos. 9 and 10 blue annealed sheets at 1.35c.; No. 28 Bessemer black at 1.85c. to 1.90c.; No. 28 galvanized at 2.75c. to 2.85c.; No. 28 black plate, tin mill sizes, H. R. and A., 1.85c.; Nos. 29 and 30, 1.90c. These prices are for carload lots, f.o.b. Pittsburgh, jobbers charging the usual advances for small lots from store.

Cotton Ties.—No announcement has been made as to prices for this year, but the Carnegie Steel Company is now rolling its quota and they are being shipped and put in stock at Southern points, from which deliveries will be made to consumers later in the year. It is understood the Sharon Steel Hoop Company will not make any cotton ties this year, and this is also true of another maker. Reports are that a very large stock of foreign ties has been stored at New Orleans for two or three years, and it is likely that these will be put on the market this year. Foreign makers have not yet announced at what price they will sell cotton ties in this country, and they are probably awaiting the announcement of prices by domestic makers.

Wire Rods.—A good many contracts for wire rods expire June 30, and some consumers are commencing to cover for the last half. We note contracts for Bessemer and open-hearth rods amounting to 5000 or 6000 tons for last-half delivery at $24.50, Pittsburgh. We quote Bessemer, open-hearth and chain rods at $24.50 to $25, Pittsburgh, the latter price for small lots.

Plates.—New inquiries for steel cars are few and not much is expected to come out until after the freight rate decision is made. The Pressed Steel Car Company has taken 500 all-steel gondola cars for the Denver & Rio Grande, and is now building 941 steel gondolas for the Virginia & Southwestern on a contract taken some months ago. The order for the Chicago & Northwestern for 3000 Otis patent gondola cars was taken by the American Car & Foundry Company. The order of the Illinois Central for 3000 box cars has not yet been placed. New orders for plates are reported to be a little better, but as a rule plate mills are not operating to over 50 per cent. of capacity. A good deal of tank work is being built in the oil fields in the West, and this is using up a large tonnage of plates. We quote ¼-in. and heavier plates at 1.10c. to 1.15c., f.o.b. Pittsburgh, the lower price being minimum of the market, and made only to the very largest trade.

Steel Rails.—No large orders are being placed for standard sections, but the Carnegie Steel Company is having a fair run of small orders ranging from 500 to 1000 tons. New demand for light rails is fair, the Carnegie Company having received new orders and speci-

fications in the past week for a little over 2000 tons. Some fairly large orders have recently been placed for splice bars. We quote splice bars at 1.50c.; standard section Bessemer rails, 1.25c.; open-hearth standard sections, 1.34c., f.o.b. Pittsburgh. We quote light rails rolled from billets as follows: 25, 30, 35, 40 and 45 lb. sections, 1.10c.; 16 and 20 lb., 1.15c.; 12 and 14 lb., 1.20c., and 8 and 10 lb., 1.25c., in carload lots, f.o.b. Pittsburgh. For large lots, these prices might be slightly shaded.

Skelp.—The new demand is dull owing to the fact that the pipe mills that buy skelp in the open market are not running to more than 50 to 60 per cent. of capacity. Hardly enough new business is coming out to test the market. We quote: Grooved steel skelp, 1.20c. to 1.25c.; sheared steel skelp, 1.25c. to 1.30c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to consumers' mills in the Pittsburgh district.

Iron and Steel Bars.—Makers of steel bars for reinforced concrete work report a very active demand. New orders for merchant iron and steel bars are quiet and mostly for small lots to cover current needs. Specifications from the large trade, such as the implement makers, are still very unsatisfactory and much below the rate at this time last year. One leading interest states it is holding steel bars at 1.15c. at mill. We quote steel bars at 1.12½c. to 1.15c., and common iron bars, in which very little scrap is used, at 1.25c. to 1.30c., f.o.b. makers' mills, Pittsburgh. Regular extras for twisting reinforcing steel bars over the base price are as follows: ¾-in. and over, $1; ½ to 11 16-in., $1.50; under ½-in., $2.50 per net ton. These extras are not always observed.

Shafting.—The new demand is no better and makers of shafting report that specifications are only fair, the amount of business coming from the automobile builders and implement makers being very disappointing. We quote cold-rolled shafting in carload lots and larger at 65 to 66 per cent. off, and it is said that in a few special cases even a larger discount has been named. We quote small lots at 63 to 64 per cent., delivered in base territory.

Spikes.—Few new orders are coming out and these are only for small lots to cover current needs of the railroads. Specifications against contracts placed early in the year are dull. We quote standard sizes of railroad spikes at 1.40c., and small railroad and boat spikes at 1.50c. per 100-lb. f.o.b. Pittsburgh.

Merchant Steel.—Mills report the new demand for seasonable steels showing some betterment, but buying is still largely of a hand-to-mouth nature, consumers not caring to cover ahead. Jobbers report that stocks are not moving out very freely. Prices are being shaded. On small lots we quote: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Steel Wheels.—The new demand is only fair, owing to the fact that so few new passenger and freight cars are being built. We quote 33-in. engine truck wheels at $21; 36-in. engine truck wheels, $22; 33-in. tender wheels, $17; 36-in. passenger and tender wheels, $19 to $19.50; 33-in. freight car wheels, $14.50 to $15, f.o.b. Pittsburgh.

Wire Products.—This is the dull season in the wire trade, and new demand is only for small lots to meet current needs of consumers or to round out stocks of jobbers. Specifications are quiet. No betterment in demand or prices is looked for until late in August or September, when buying for the fall trade is expected to start. On carload lots we quote wire nails at $1.55; plain annealed wire, $1.35 to $1.40; galvanized barb wire and fence staples, $1.95 to $2; painted barb wire, $1.55 to $1.60, all per 100 lb., f.o.b. Pittsburgh, with actual freight added to point of delivery, terms being 30 days net less 2 per cent. off for cash in 10 days. We quote cut nails at $1.60, f.o.b. Pittsburgh. Discounts on woven wire fencing are 73½ per cent. off in carload lots, 72½ per cent. off on 1000-rod lots and 71½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Hoops and Bands.—The new demand for both hoops and bands is dull. There will not be any buying of moment in hoops until August, at which time the distillers usually place contracts for shipments to commence in September. Specifications against contracts for hoops and bands are very quiet, and all the mills are badly in need of new business. We quote steel bands at 1.12½c. to 1.15c., with extras as per the steel-bar card, and steel hoops at 1.25c., f.o.b. Pittsburgh.

Bolts, Nuts and Rivets.—Makers report the new demand for rivets as quiet and mostly for small lots. When a good-sized order comes into the market competition is keen and usually low prices are made. The new demand for nuts and bolts is also dull, consumers buying only for actual wants and jobbers taking such quantities as are needed to complete stocks. We quote buttonhead structural rivets in carloads at 1.55c. and in small lots 1.60c. to 1.65c.; conehead boiler rivets at 1.65c. in carload lots, and 1.70c. to 1.75c. in small lots, with terms 30 days net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws	80 and 5%
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blanked and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.p.c. and r sq. nuts, blanked and tapped	$6.00 off list
Hexagon nuts, ⅝ and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, ½ in. and smaller	85, 10 & 10% off
Semi-fin. hex. nuts, ⅝ in. and larger	85 and 5% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, metallic tinned, bulk	80, 10 and 10% off
Rivets, tin plated, bulk	80, 10 and 10% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set screws	75, 10 and 10% off

Boiler Tubes.—The demand for locomotive tubes is fair, but for merchant tubes is very dull, as it has been for some months. Discounts on both iron and steel boiler tubes are not being firmly held.

Standard Pipe.—As noted last week indications are for a betterment in demand in the pipe trade in the near future. Stocks held by jobbers are low, and as the buying has been from hand to mouth for a long time will soon have to be replenished. As a rule pipe mills are running to not over 60 per cent. of capacity and some at only about 50 per cent. Discounts on iron and steel pipe are being fairly well maintained.

Coke.—An inquiry is in the market for 12,000 tons of furnace coke per month for July to December, and possibly through first half of next year for delivery in the Chicago district. Several leading makers are still holding standard furnace coke for last half delivery at $2, but furnaces are not inclined to pay this price, contending that the present pig-iron market does not warrant it. Sales of standard furnace coke are still being made for prompt delivery at about $1.75 per net ton at oven. On contracts for last half of the year furnace coke is held at $1.85 to $2 per net ton at oven. Best makes of 72-hr. foundry coke are held at about $2.40 to $2.50 per net ton at oven to consumers. More than 3000 ovens in the Connellsville regions were blown out last week on account of the dull demand. The Connellsville Courier gives the output of coke in the upper and lower Connellsville regions for the week ended May 16 at 294,715 net tons, a decrease over the previous week of more than 15,000 tons.

Old Material.—While there is no new buying it is said that two or three consumers have commenced to draw on their stocks, and for this reason are expected to be in the market before long as buyers. Several local

dealers are not anxious to sell ahead at present prices, believing the market will shortly take an upward turn. The sale of 300 tons of cast-iron borings noted in this report last week at $7.75 delivered should have read machine shop turnings. Machine shops have not been running very full for some time, and for this reason cast-iron borings are scarce and prices are firm. A local dealer reports a sale of 500 tons of borings at $8.50 and 200 tons of turnings at $7.75, both delivered at Brackenridge, Pa. Dealers quote, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts that take the same rates of freight as follows:

Selected heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland Pittsburgh delivery	$12.00 to $12.25
Ordinary steel melting scrap	11.50 to 11.75
Compressed side and end sheet scrap	11.25 to 11.50
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.75 to 9.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock	11.00 to 11.25
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	14.50
Iron car axles	22.50 to 23.00
Steel car axles	15.50 to 16.00
Locomotive axles, steel	20.00 to 20.50
No. 1 busheling scrap	10.25 to 10.50
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	7.75 to 8.00
Old carwheels	11.25 to 11.50
Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	12.00 to 12.25
Old iron rails	13.75 to 14.00
No. 1 railroad wrought scrap	11.50 to 11.75
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	12.00 to 12.25

†Shipping point.

Chicago

CHICAGO, ILL., May 27, 1914.—(*By Wire.*)

The long established habit of testing out the market with inquiry in anticipation of the requirements of an ensuing quarterly period is doubtless responsible for some of the increasing interest now being displayed. But a lack of animation betrays the fact that few buyers of iron and steel have much encouragement in their own business at the present time. It is estimated that the foundries of the West are melting not over 50 per cent. of their normal tonnage. Current sales of pig iron are accordingly very meager. An exception is the purchases of a St. Louis district steel foundry which have now been increased to a total of 24,000 tons. Largely because of orders received from fabricators and car builders, specifications booked last week were much above recent figures in tonnage. Prices for the heavier lines of steel are about as they were a week ago but the weakness in sheets is more pronounced. Reductions have been made in the price of sheets out of store. Beyond a few casual requests as to the probable basis for contracts, the implement interests have made no advances in the matter of steel bars. It is likely that the mills will make a more determined effort this year to hold bar contracts within a six months period.

Pig Iron.—A Chicago user of basic iron normally melting about 2000 tons a month is understood to have covered the greater portion of its requirements for the last half. Contrasted with its original inquiry for 10,000 tons, the purchases of basic by the Commonwealth Steel Company now total 24,000 tons. This aggregate is made up of lots of 10,000, 5000, 6000 and 3000 tons, of which the first named only will be furnished from merchant stacks. The price has already been reported and obviously compares favorably in the mind of the buyer with what the future will have to offer. For foundry iron, both local and Southern, the outlook is still a closed book and melters continue the policy of feeling their way. Both Northern and Southern quotations are of unknown strength, but in the absence of attractive business are being maintained quite uniformly. Since one Mayville stack has been blown out there are now active in this district but six furnaces. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.75 to $16.75
Northern coke foundry, No. 1	14.75 to 15.00
Northern coke foundry, No. 2	14.00 to 14.50
Northern coke foundry, No. 3	13.75 to 14.00
Southern coke, No. 1 f'dry and 1 soft	15.35 to 15.85
Southern coke, No. 2 f'dry and 2 soft	14.85 to 15.35
Malleable Bessemer	14.00 to 14.50
Standard Bessemer	17.00
Basic	13.25 to 13.50
Low phosphorus	21.50 to 22.25
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—The total of rail sales and specifications during the week hardly exceeds 10,000 tons and the mills of the district continue running at a halting gait. Some unimportant but eagerly sought specifications for track supplies have been released at the solicitation of the mills but the railroads are accepting very little for early delivery. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; tie plates, $26 to $28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The closing by the Illinois Central for 3000 cars, which has been postponed from day to day, is still in the future and no additional car business of moment has appeared. Specifications to mill from car builders, bridge shops and jobbers, however, have been more liberal this week and fabricators report that there are fewer instances of very low prices for fabricated steel. In respect to tonnage, the contract for the Meier and Frank Building, Portland, Ore., carrying 3500 tons, to the Northwest Steel Company was the largest reported in the West. The Texas Company's building, Houston, Tex., will require 1433 tons, to be furnished by the Houston Structural Steel Company. Miscellaneous contracts include the W. L. De Wolf & Co.'s building, Chicago, 827 tons, to the Gage Structural Steel Company; three bridge spans for Douglas County, Ore., 100 tons, to the Minneapolis Steel & Machinery Company; Chicago, Milwaukee & St. Paul, 478 tons to the Wisconsin Bridge & Iron Company and 159 tons to the American Bridge Company; Utah Railway viaduct at Helper, Utah, 255 tons, to the American Bridge Company. The situation as to the price of plain material from mill has not changed since last reported and with the exception of a few instances of extreme concessions shapes are quotable for Chicago delivery from mill 1.28c. to 1.33c.

We quote for Chicago delivery of shapes from store in small lots 1.75c.

Plates.—The Chicago & Northwestern has placed its order for 40 locomotives with the American Locomotive Company. Plates shared to a limited extent in the improved tonnage of specifications last week but with one possible exception Western plate mills have scarcely enough business to permit the arrangement of rolling schedules from week to week. For Chicago delivery, from mill, we continue to quote 1.25c. to 1.30c.

For Chicago delivery of plates from store in small quantities we quote 1.75c.

Sheets.—Despite the proximity of the third quarter and the low level of prices prevailing, buyers of sheets appear to be but little interested in their requirements for the future. Local mills report a few sales and contracts involving deliveries over the next 60 days. The mills, while anxious for business, have thus far maintained a firm attitude on the question of extended deliveries at going prices. The market is now quite generally on the basis of 2.98c., Chicago, for galvanized and the reports of quotations $1 a ton below this price are too numerous to be overlooked. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.48c.; No. 28 black, 1.98c.; No. 28 galvanized, 2.98c.

As an adjustment to meet the weakness of the sheet market, store prices for black and galvanized sheets have been reduced and we quote for Chicago delivery as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.35c. to 2.45c.; No. 28 galvanized, 3.35c. to 3.45c.

Bars.—Specifications and orders for mild steel bars are almost exclusively of small tonnage for the speediest possible delivery. From the implement interests no signs appear that contracting for the ensuing year

is of any immediate importance. The most attractive business in sight in reinforcing bars has not yet matured, but a steady run of miscellaneous tonnage is reported. There is a sufficient quantity of hard steel bar business appearing from week to week to keep the mills running steadily though at a reduced rate. We quote for mill shipments as follows: Bar iron, 1.10c.; soft steel bars, 1.28c. to 1.33c.; hard steel bars, 1.25c. to 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Rivets and Bolts.—The market continues discouragingly meager in its offerings of new business. Prices are altogether nominal as quoted, and concessions are the rule. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-5; cut thread, 80; larger sizes, 75-5; machine bolts up to ⅜ x 4 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-10; coach screws, 80-15; hot pressed nuts, square head, $6.20 off per cwt.; hexagon, $7 off per cwt. Structural rivets, ½ to 1¼ in., 1.73c. to 1.78c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.35c.; boiler rivets, 2.55c.; machine bolts up to ¾ x 4 in., 75-10; larger sizes, 70-10-5; carriage bolts up to ⅜ x 6 in., 75-5; larger sizes, 70-10 off; hot pressed nuts, square head, $6, and hexagon, $6.70 off per cwt.

Old Material.—Transactions during the week in No. 1 railroad wrought established this market at $9 delivered at buyer's works and No. 1 busheling at $7.50. Activity was by no means general nor of continued duration. The prices at which railroad scrap was sold were close to the level of the consumer's market. While specific occasions for lowering quotations on a number of grades are lacking, the market is generally weak at the prices given below. New offerings of railroad scrap include 3300 tons from the Illinois Central, 12,000 tons from the Baltimore & Ohio, 5000 tons from the Rock Island, 1900 tons from the Grand Trunk, 525 tons from the Monon and 880 tons from the Standard Oil Company, a total closely approaching 25,000 tons. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$12.75 to $13.25
Old steel rails, rerolling	11.25 to 11.75
Old steel rails, less than 3 ft	10.50 to 11.00
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	11.50 to 11.75
Heavy melting steel scrap	9.50 to 10.00
Frogs, switches and guards, cut apart	9.50 to 10.00
Shoveling steel	9.00 to 9.50
Steel axle turnings	6.75 to 7.25

Per Net Ton

Iron angles and splice bars	$12.00 to $12.50
Iron arch bars and transoms	12.00 to 12.50
Steel angle bars	9.00 to 9.50
Iron car axles	17.00 to 17.50
Steel car axles	12.25 to 12.50
No. 1 railroad wrought	9.00 to 9.25
No. 2 railroad wrought	8.50 to 8.75
Cut forge	8.50 to 8.75
Steel knuckles and couplers	9.00 to 9.50
Steel springs	9.25 to 9.75
Locomotive tires, smooth	9.75 to 10.00
Machine shop turnings	5.00 to 5.50
Cast borings	4.50 to 5.00
No. 1 busheling	7.50 to 7.75
No. 2 busheling	6.00 to 6.25
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
Boiler punchings	9.25 to 9.75
No. 1 cast scrap	10.00 to 10.25
Stove plate and light cast scrap	9.00 to 9.50
Grate bars	8.75 to 9.25
Railroad malleable	9.00 to 9.50
Agricultural malleable	8.00 to 8.50
Pipes and flues	6.50 to 7.00

Cast-Iron Pipe.—At St. Louis last week an award of 1000 tons was made to the United States Cast Iron Pipe & Foundry Company and at Cincinanti bids were taken on 600 tons of high pressure pipe. In contrast to the scarcity of large tonnage orders that part of the business made up of miscellaneous bookings is being maintained at about normal. Gas pipe sales aggregated in the neighborhood of 2000 tons. We quote as follows: per net ton, Chicago: Water pipe, 4 in., $26; 6 to 12 in., $24; 16 in. and up, $23.50, with $1 extra for gas pipe.

Wire Products.—The quietness in the wire trade is increasingly accentuated, although the lack of demand is not equally distributed. Shipments of fencing and plain wire are reported as more satisfactory than the wire nail movement. Recent prices indicate that the basis of 1.55c., Pittsburgh, is now the upper level of the market, and desirable specifications are likely to evoke concessions of $1 a ton from this price. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.53 to $1.58; wire nails, $1.73 to $1.78; painted barb wire, $1.73 to $1.78; galvanized, $2.13 to $2.18; polished staples, $1.73 to $1.78; galvanized, $2.08 to $2.13, all Chicago.

Hoops and Bands.—The contracting for hoop and band steel for third quarter has not opened up in a very encouraging way either with respect to tonnage or price. The placing of some business is noted, from which we quote for Chicago delivery of bands 1.33c. and for hoops 1.43c.

Philadelphia

PHILADELPHIA, PA., May 26, 1914.

Sentiment is unquestionably better. Sales of a few finished products have improved to a slight extent, but the only change in prices has been an occasional dip here and there below what is generally accepted as the market. Discussions of trade conditions invariably swing around to illustrations of the rigid economy which is being practiced by the railroads, the almost bare state of their storekeepers' stocks and the makeshifts they resort to in avoiding expenditure. Consumers of foundry grades of pig iron are showing a little more interest, but they need more business themselves to make them follow the steel manufacturers who recently showed their faith in the future and their realization of bargain prices by contracting for many thousand tons of basic. Foundry stocks are low and any increased demand upon them will call for quick deliveries. Billets and sheets are moving so unsatisfactorily, both as regards sales and prices, that an Eastern maker has curtailed operations. The demand for bars and plates is a trifle better, with small orders still predominating. Current small orders for structural shapes are fewer. The coke market is backward.

Iron Ore.—The market is waiting on better activity and higher prices in pig iron. While new business is lacking deliveries on contracts are running full and importations are about normal. The arrivals at this port last week were 16,359 tons from Sweden, 5700 tons from Cuba and 305 tons from Scotland. In April the total of foreign ore imported here was 71,219 tons.

Pig Iron.—As a result of the recent heavy buying of basic pig iron in this territory more interest in foundry grades has been shown, followed by somewhat more numerous small lot sales, but the volume of actual business is not much greater than has been characteristic of the past few weeks. It is conceded that the one influence needed to cause founders to replenish their stocks is a little increase in the orders for castings. That stocks are unusually low is indicated by the stress now placed upon the need for quick deliveries, even where only 100 tons or 200 tons are involved. The big buying of basic ended the activity in steel-making iron for the time being, as the few remaining steel makers hereabout are sufficiently well covered, at least for the near future. A few odd lots of standard low phosphorus have been bought at $21 delivered here. On the whole prices are well maintained, though talk is heard that some sellers have shaded the already low quotations rather than let what would be ordinarily insignificant business get away from them. Some pipe iron has been taken where it could be had at low figures though not a great deal. No word is heard of any break in the quotations for Virginia iron, despite the fact that it is extremely quiet, a leading seller having disposed of only 1100 tons this month. As an evidence of sustained prices mention is made of one lot of 100 tons of Virginia No. 2 X which was delivered to a point a little outside of Philadelphia at $16.10. In the week ended May 23 the importations of pig iron at this port were 200 tons from England and 3315 tons from Nova Scotia. In April the total importation, as given by the local custom house, was 4449 tons. The following range

dealers are not anxious to sell ahead at present prices, believing the market will shortly take an upward turn. The sale of 300 tons of cast-iron borings noted in this report last week at $7.75 delivered should have read machine shop turnings. Machine shops have not been running very full for some time, and for this reason cast-iron borings are scarce and prices are firm. A local dealer reports a sale of 500 tons of borings at $8.50 and 200 tons of turnings at $7.75, both delivered at Brackenridge, Pa. Dealers quote, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts that take the same rates of freight as follows:

Selected heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland Pittsburgh delivery	$12.00 to $12.25
Ordinary steel melting scrap	11.50 to 11.75
Compressed side and end sheet scrap	11.25 to 11.50
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.75 to 9.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock	11.00 to 11.25
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	14.50
Iron car axles	22.50 to 23.00
Steel car axles	15.50 to 16.00
Locomotive axles, steel	20.00 to 20.50
No. 1 busheling scrap	10.25 to 10.50
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	7.75 to 8.00
Old carwheels	11.25 to 11.50
Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	12.00 to 12.25
Old iron rails	13.75 to 14.00
No. 1 railroad wrought scrap	11.50 to 11.75
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	12.00 to 12.25

†Shipping point.

Chicago

CHICAGO, ILL., May 27, 1914.—(*By Wire.*)

The long established habit of testing out the market with inquiry in anticipation of the requirements of an ensuing quarterly period is doubtless responsible for some of the increasing interest now being displayed. But a lack of animation betrays the fact that few buyers of iron and steel have much encouragement in their own business at the present time. It is estimated that the foundries of the West are melting not over 50 per cent. of their normal tonnage. Current sales of pig iron are accordingly very meager. An exception is the purchases of a St. Louis district steel foundry which have now been increased to a total of 24,000 tons. Largely because of orders received from fabricators and car builders, specifications booked last week were much above recent figures in tonnage. Prices for the heavier lines of steel are about as they were a week ago but the weakness in sheets is more pronounced. Reductions have been made in the price of sheets out of store. Beyond a few casual requests as to the probable basis for contracts, the implement interests have made no advances in the matter of steel bars. It is likely that the mills will make a more determined effort this year to hold bar contracts within a six months period.

Pig Iron.—A Chicago user of basic iron normally melting about 2000 tons a month is understood to have covered the greater portion of its requirements for the last half. Contrasted with its original inquiry for 10,000 tons, the purchases of basic by the Commonwealth Steel Company now total 24,000 tons. This aggregate is made up of lots of 10,000, 5000, 6000 and 3000 tons, of which the first named only will be furnished from merchant stacks. The price has already been reported and obviously compares favorably in the mind of the buyer with what the future will have to offer. For foundry iron, both local and Southern, the outlook is still a closed book and melters continue the policy of feeling their way. Both Northern and Southern quotations are of unknown strength, but in the absence of attractive business are being maintained quite uniformly. Since one Mayville stack has been blown out there are now active in this district but six furnaces. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.75 to $16.75
Northern coke foundry, No. 1	14.75 to 15.00
Northern coke foundry, No. 2	14.00 to 14.50
Northern coke foundry, No. 3	13.75 to 14.00
Southern coke, No. 1 f'dry and 1 soft	15.35 to 15.85
Southern coke, No. 2 f'dry and 2 soft	14.85 to 15.35
Malleable Bessemer	14.00 to 14.50
Standard Bessemer	17.00
Basic	13.25 to 13.50
Low phosphorus	21.50 to 22.25
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—The total of rail sales and specifications during the week hardly exceeds 10,000 tons and the mills of the district continue running at a halting gait. Some unimportant but eagerly sought specifications for track supplies have been released at the solicitation of the mills but the railroads are accepting very little for early delivery. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; tie plates, $26 to $28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The closing by the Illinois Central for 3000 cars, which has been postponed from day to day, is still in the future and no additional car business of moment has appeared. Specifications to mill from car builders, bridge shops and jobbers, however, have been more liberal this week and fabricators report that there are fewer instances of very low prices for fabricated steel. In respect to tonnage, the contract for the Meier and Frank Building, Portland, Ore., carrying 3500 tons, to the Northwest Steel Company was the largest reported in the West. The Texas Company's building, Houston, Tex., will require 1433 tons, to be furnished by the Houston Structural Steel Company. Miscellaneous contracts include the W. L. De Wolf & Co.'s building, Chicago, 827 tons, to the Gage Structural Steel Company; three bridge spans for Douglas County, Ore., 100 tons, to the Minneapolis Steel & Machinery Company; Chicago, Milwaukee & St. Paul, 478 tons to the Wisconsin Bridge & Iron Company and 159 tons to the American Bridge Company; Utah Railway viaduct at Helper, Utah, 255 tons, to the American Bridge Company. The situation as to the price of plain material from mill has not changed since last reported and with the exception of a few instances of extreme concessions shapes are quotable for Chicago delivery from mill 1.28c. to 1.33c.

We quote for Chicago delivery of shapes from store in small lots 1.75c.

Plates.—The Chicago & Northwestern has placed its order for 40 locomotives with the American Locomotive Company. Plates shared to a limited extent in the improved tonnage of specifications last week but with one possible exception Western plate mills have scarcely enough business to permit the arrangement of rolling schedules from week to week. For Chicago delivery, from mill, we continue to quote 1.25c. to 1.30c.

For Chicago delivery of plates from store in small quantities we quote 1.75c.

Sheets.—Despite the proximity of the third quarter and the low level of prices prevailing, buyers of sheets appear to be but little interested in their requirements for the future. Local mills report a few sales and contracts involving deliveries over the next 60 days. The mills, while anxious for business, have thus far maintained a firm attitude on the question of extended deliveries at going prices. The market is now quite generally on the basis of 2.98c., Chicago, for galvanized and the reports of quotations $1 a ton below this price are too numerous to be overlooked. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.48c.; No. 28 black, 1.98c.; No. 28 galvanized, 2.98c.

As an adjustment to meet the weakness of the sheet market, store prices for black and galvanized sheets have been reduced and we quote for Chicago delivery as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.35c. to 2.45c.; No. 28 galvanized, 3.35c. to 3.45c.

Bars.—Specifications and orders for mild steel bars are almost exclusively of small tonnage for the speediest possible delivery. From the implement interests no signs appear that contracting for the ensuing year

is of any immediate importance. The most attractive business in sight in reinforcing bars has not yet matured, but a steady run of miscellaneous tonnage is reported. There is a sufficient quantity of hard steel bar business appearing from week to week to keep the mills running steadily though at a reduced rate. We quote for mill shipments as follows: Bar iron, 1.10c.; soft steel bars, 1.28c. to 1.33c.; hard steel bars, 1.25c. to 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Rivets and Bolts.—The market continues discouragingly meager in its offerings of new business. Prices are altogether nominal as quoted, and concessions are the rule. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-5; cut thread, 80; larger sizes, 75-5; machine bolts up to ⅜ x 4 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-10; coach screws, 80-15; hot pressed nuts, square head, $6.20 off per cwt.; hexagon, $7 off per cwt. Structural rivets, ½ to 1¼ in., 1.73c. to 1.78c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.35c.; boiler rivets, 2.55c.; machine bolts up to ¾ x 4 in., 75-10; larger sizes, 70-10-5; carriage bolts up to ⅜ x 6 in., 75-5; larger sizes, 70-10 off; hot pressed nuts, square head, $6, and hexagon, $6.70 off per cwt.

Old Material.—Transactions during the week in No. 1 railroad wrought established this market at $9 delivered at buyer's works and No. 1 busheling at $7.50. Activity was by no means general nor of continued duration. The prices at which railroad scrap was sold were close to the level of the consumer's market. While specific occasions for lowering quotations on a number of grades are lacking, the market is generally weak at the prices given below. New offerings of railroad scrap include 3300 tons from the Illinois Central, 12,000 tons from the Baltimore & Ohio, 5000 tons from the Rock Island, 1900 tons from the Grand Trunk, 525 tons from the Monon and 880 tons from the Standard Oil Company, a total closely approaching 25,000 tons. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$12.75 to	$13.25
Old steel rails, rerolling	11.25 to	11.75
Old steel rails, less than 3 ft.	10.50 to	11.00
Relaying rails, standard section, subject to inspection		24.00
Old carwheels	11.50 to	11.75
Heavy melting steel scrap	9.50 to	10.00
Frogs, switches and guards, cut apart	9.50 to	10.00
Shoveling steel	9.00 to	9.50
Steel axle turnings	6.75 to	7.25
	Per Net Ton	
Iron angles and splice bars	$12.00 to	$12.50
Iron arch bars and transoms	12.00 to	12.50
Steel angle bars	9.00 to	9.50
Iron car axles	17.00 to	17.50
Steel car axles	12.25 to	12.50
No. 1 railroad wrought	9.00 to	9.25
No. 2 railroad wrought	8.50 to	8.75
Cut forge	8.50 to	8.75
Steel knuckles and couplers	9.00 to	9.50
Steel springs	9.25 to	9.75
Locomotive tires, smooth	9.75 to	10.00
Machine shop turnings	5.00 to	5.50
Cast borings	4.50 to	5.00
No. 1 busheling	7.50 to	7.75
No. 2 busheling	6.00 to	6.25
No. 1 boilers, cut to sheets and rings	6.50 to	7.00
Boiler punchings	9.25 to	9.75
No. 1 cast scrap	10.00 to	10.25
Stove plate and light cast scrap	9.00 to	9.50
Grate bars	8.75 to	9.25
Railroad malleable	9.00 to	9.50
Agricultural malleable	8.00 to	8.50
Pipes and flues	6.50 to	7.00

Cast-Iron Pipe.—At St. Louis last week an award of 1000 tons was made to the United States Cast Iron Pipe & Foundry Company and at Cincinnati bids were taken on 600 tons of high pressure pipe. In contrast to the scarcity of large tonnage orders that part of the business made up of miscellaneous bookings is being maintained at about normal. Gas pipe sales aggregated in the neighborhood of 2000 tons. We quote as follows: per net ton, Chicago: Water pipe, 4 in., $26; 6 to 12 in., $24; 16 in. and up, $23.50, with $1 extra for gas pipe.

Wire Products.—The quietness in the wire trade is increasingly accentuated, although the lack of demand is not equally distributed. Shipments of fencing and plain wire are reported as more satisfactory than the wire nail movement. Recent prices indicate that the basis of 1.55c., Pittsburgh, is now the upper level of the market, and desirable specifications are likely to evoke concessions of $1 a ton from this price. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.53 to $1.58; wire nails, $1.73 to $1.78; painted barb wire, $1.73 to $1.78; galvanized, $2.13 to $2.18; polished staples, $1.73 to $1.78; galvanized, $2.08 to $2.13, all Chicago.

Hoops and Bands.—The contracting for hoop and band steel for third quarter has not opened up in a very encouraging way either with respect to tonnage or price. The placing of some business is noted, from which we quote for Chicago delivery of bands 1.33c. and for hoops 1.43c.

Philadelphia

PHILADELPHIA, PA., May 26, 1914.

Sentiment is unquestionably better. Sales of a few finished products have improved to a slight extent, but the only change in prices has been an occasional dip here and there below what is generally accepted as the market. Discussions of trade conditions invariably swing around to illustrations of the rigid economy which is being practiced by the railroads, the almost bare state of their storekeepers' stocks and the makeshifts they resort to in avoiding expenditure. Consumers of foundry grades of pig iron are showing a little more interest, but they need more business themselves to make them follow the steel manufacturers who recently showed their faith in the future and their realization of bargain prices by contracting for many thousand tons of basic. Foundry stocks are low and any increased demand upon them will call for quick deliveries. Billets and sheets are moving so unsatisfactorily, both as regards sales and prices, that an Eastern maker has curtailed operations. The demand for bars and plates is a trifle better, with small orders still predominating. Current small orders for structural shapes are fewer. The coke market is backward.

Iron Ore.—The market is waiting on better activity and higher prices in pig iron. While new business is lacking deliveries on contracts are running full and importations are about normal. The arrivals at this port last week were 16,359 tons from Sweden, 5700 tons from Cuba and 305 tons from Scotland. In April the total of foreign ore imported here was 71,219 tons.

Pig Iron.—As a result of the recent heavy buying of basic pig iron in this territory more interest in foundry grades has been shown, followed by somewhat more numerous small lot sales, but the volume of actual business is not much greater than has been characteristic of the past few weeks. It is conceded that the one influence needed to cause founders to replenish their stocks is a little increase in the orders for castings. That stocks are unusually low is indicated by the stress now placed upon the need for quick deliveries, even where only 100 tons or 200 tons are involved. The big buying of basic ended the activity in steel-making iron for the time being, as the few remaining steel makers hereabout are sufficiently well covered, at least for the near future. A few odd lots of standard low phosphorus have been bought at $21 delivered here. On the whole prices are well maintained, though talk is heard that some sellers have shaded the already low quotations rather than let what would be ordinarily insignificant business get away from them. Some pipe iron has been taken where it could be had at low figures though not a great deal. No word is heard of any break in the quotations for Virginia iron, despite the fact that it is extremely quiet, a leading seller having disposed of only 1100 tons this month. As an evidence of sustained prices mention is made of one lot of 100 tons of Virginia No. 2 X which was delivered to a point a little outside of Philadelphia at $16.10. In the week ended May 23 the importations of pig iron at this port were 200 tons from England and 3315 tons from Nova Scotia. In April the total importation, as given by the local custom house, was 4449 tons. The following range

of prices represents the general market for near delivery in buyers' yards in this district:

Eastern Penna. No. 2 X foundry	$14.75 to $15.25
Eastern Penna. No. 2 plain	14.50 to 14.75
Virginia No. 2 X foundry	15.55 to 15.75
Virginia No. 2 plain	15.30 to 15.55
Gray forge	13.75 to 14.00
Basic	14.00
Standard low phosphorus	21.00

Ferroalloys.—The quotations for both English and German 80 per cent. ferromanganese are unchanged at $38 seaboard. There has been an inquiry for a few carloads from a Western consumer, but business was contingent on concessions and these were not granted by the dealer approached. Ferrosilicon is unchanged at $71 to $73, Pittsburgh, depending on quantity. In April 2282 tons of ferromanganese arrived at this port. Only 75 tons of ferrosilicon was brought in.

Billets.—Local producers are operating about 65 per cent. They see no signs of betterment and their present mood is to shut down rather than accept unprofitable business which has been offered to them. Open-hearth rolling billets are quoted here at $22.40 per ton, with forging steel $4 to $5 higher.

Structural Material.—Eastern mills, one of which is operating at between 50 and 55 per cent. of capacity on specifications booked some weeks ago, are feeling a dearth of small orders which are acceptable to fill in and steady mill operations, as well as because of the better price they command. Despite the lack of these small orders which were reasonably numerous until a week ago, the tonnage on the books is better than it was a month ago. Mill representatives are interested in the amount of steel which will be required for several brick and concrete buildings to be erected by the Hellwig Silk Dyeing Company, of this city, and for which Carl P. Berger, Penn Square Building, is the architect. The quotations for plain shapes is 1.30c., Philadelphia, on such business as is coming to light. Sellers admit that desirable propositions would bring out 1.25c. or 1.27½c.

Bars.—Orders for iron bars are no more plentiful and as a rule smaller. The market is about 1.20c., Philadelphia, though lower might be done, it is admitted, in the case of odd lots and where mills are situated so near this city as to have a very small freight rate or haulage charge. Steel bars in the last week have been possibly a trifle more active, though they could stand much betterment. In the case of estimates submitted on 600 tons 1.29c., Philadelphia, was the lowest bid, but 1.30c. is the general quotation, with highly desirable business possible at 1.25c.

Plates.—While no individually large orders have come out those which are current are more attractive as regards size and sellers believe that the last few days have brought a betterment. A representative mill is operating at about 70 per cent. and is figuring on an increased amount of boat and locomotive work. Quotations are unchanged at 1.30c., Philadelphia, for the general run of orders, with 1.25c. probable on a better run of business.

Sheets.—Orders for sheets, which have been of a hand-to-mouth character for some weeks, have fallen off in a disappointing way and one Eastern maker shut down three mills in the last week and has determined not to recede from 1.50c., delivered, for No. 10 blue annealed sheets. Operations in this mill are proceeding at about 65 per cent. of capacity, but the outlook is unsatisfactory.

Coke.—Buying of spot furnace coke has been light at $1.75 to $1.90 per net ton at oven. Contract furnace coke continues to be held at $2 but with few takers. Some business in contract foundry coke is reported on a basis of $2.95 per net ton at oven, one lot of 600 tons and another of 800 tons having been taken on that basis. Prompt foundry coke is quiet at $2.35 to $2.50 per net ton at oven. Freight rates to this city from the producing districts are as follows: Connellsville, $2.05; Mountain, $1.65; Latrobe, $1.85.

Old Material.—A somewhat increased interest is reported by dealers, but it has not developed into actual business. In view of the better sentiment the situation is described as one of hopeful dullness in spite of the fact that in a few cases delivery on contracts has been delayed by request. The following quotations about represent the market for deliveries in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$10.75 to $11.00
Old steel rails, rerolling	12.00 to 12.50
Low phosphorus heavy melting steel scrap	14.50 to 15.00
Old steel axles	14.00 to 14.50
Old iron axles (nominal)	20.00 to 21.00
Old iron rails	15.00 to 15.50
Old carwheels	11.75 to 12.25
No. 1 railroad wrought	12.50 to 13.00
Wrought-iron pipe	9.50 to 10.00
No. 1 forge fire	8.00 to 8.50
Bundled sheets	8.00 to 8.50
No. 2 light iron	5.00 to 5.50
No. 2 busheling	8.00 to 8.50
Wrought turnings	7.50 to 8.00
Cast borings	8.00 to 8.50
No. 1 cast	12.00 to 12.50
Grate bars, railroad	8.50 to 9.00
Stove plate	8.50 to 9.00
Railroad malleable	9.00 to 9.50

Cincinnati

CINCINNATI, OHIO, May 27, 1914.—(*By Wire.*)

Pig Iron.—A steel company in this territory is expected to close soon for 10,000 tons of basic for last half shipment. It is rumored that another manufacturer is feeling the market for a last quarter supply of basic. Other inquiries include two for low-phosphorus iron from Michigan and northern Ohio melters for approximately 500 tons each. A consumer in the Chicago territory is asking for quotations on 3000 tons of high silicon iron. In this immediate vicinity there is very little buying of foundry iron, and the only local inquiry is for 100 tons of Southern No. 2. A sale of 1200 tons of Southern foundry was made to an Indiana melter last week for July-December shipment. While there is yet considerable complaint as to shipments being held up on old contracts, there has been some improvement in this respect the past week, indicating that yard stocks are being exhausted. A number of small sales of Ohio silvery iron have been made, but no contracts have been booked below $16 at furnaces, as far as can be ascertained. A sanitary manufacturing firm bought 700 tons of Southern No. 3 and is now negotiating for an additional 500 tons to be shipped to its Louisville plant. Malleable is slow. Prices are unchanged in all districts. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$14.25 to $14.75
Southern coke, No. 2 f'dry and 2 soft.	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.70 to 16.20
Southern Ohio coke, No. 2	14.70 to 15.20
Southern Ohio coke, No. 3	14.45 to 14.70
Southern Ohio malleable Bessemer	14.70 to 15.20
Basic, Northern	14.70 to 15.20
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(*By Mail*)

Coke.—Buyers of both furnace and foundry coke are hesitating about placing any contract business. The period for purchasing furnace coke has been put at a later date than for a number of years. This has resulted in the curtailment in production in all three fields. The foundries in this territory are supplied with coke for probably three months at the present rate of operation. A few carloads of 48-hr. coke that had to be moved promptly have been sold at $1.75 per net ton at oven in both the Connellsville and Wise County fields, but the prompt shipment price is generally maintained around $1.85 in all three districts, with 10c. to 15c. a ton higher asked on contract business. Foundry coke is unchanged at $2.50 to $2.75 at oven in all three fields.

Finished Material.—From a few sources, notably the sheet rolling mills, there is an undertone of feeling that is somewhat more encouraging. However, business

in most finished lines is still slow, buying being confined to carload lots for immediate requirements. We quote No. 28 black sheets at 2c, f.o.b. cars Cincinnati, or Newport, Ky., and galvanized at 2.95c. Rumors as to impending railroad buying are discounted here, and, with the exception of small lots of track material, there is little business to report from this source. Local stores report only hand-to-mouth buying, and they are not trying to bring out any business by cutting prices. Consequently, we are able to continue our quotations on steel bars and light structural shapes at 1.75c. and 1.85c. respectively. There is no improvement in the situation with the hoop and band trade.

Old Material.—Quotations are unchanged on all grades of scrap, simply because there is practically no demand from any source. The rolling mills are not buying any large tonnages, and the foundries are out of the market, except for urgent requirements. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.75 to	$7.25
Old iron rails	11.75 to	12.25
Relaying rails, 50 lb. and up	19.75 to	20.25
Rerolling steel rails	10.75 to	11.25
Melting steel rails	9.25 to	9.75
Old carwheels	10.25 to	10.75

Per Net Ton

No. 1 railroad wrought	$8.75 to	$9.25
Cast borings	4.50 to	5.00
Steel turnings	4.50 to	5.25
Railroad cast scrap	9.25 to	9.75
No. 1 machinery cast scrap	10.25 to	11.25
Burnt scrap	6.00 to	6.75
Old iron axles	16.75 to	17.25
Locomotive tires (smooth inside)	9.75 to	10.25
Pipes and flues	6.25 to	6.75
Malleable and steel scrap	7.25 to	7.75
Railroad tank and sheet scrap	5.25 to	5.75

Cleveland

CLEVELAND, OHIO, May 26, 1914.

Iron Ore.—The market as yet shows no life. Very little ore has been sold since the season's prices have been established and these sales have been in small lots. Some negotiations are going on with Eastern furnaces, but the general disposition in the east seems also to be to delay purchasing. Sellers do not look for much activity in the market until general conditions show an improvement. We quote prices as follows: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—One Cleveland interest has sold one lot of 2000 tons of foundry iron for the last half and a few small lots. Little new inquiry is coming out. There are no new basic inquiries. The American Steel Foundries, which has an inquiry out for 10,000 tons, is not yet reported to have bought. Information has come out to the effect that all the basic iron recently bought by an Ohio steel company went to Cleveland interests. The low price at which this company secured its first 15,000 tons prompted it to buy 25,000 tons additional, which will about cover its requirements for the last half. Cleveland furnaces are adhering to $14.25 for No. 2 foundry, delivered here, and as a result of the lower prices prevailing in the Valley, some Valley iron has been recently sold for shipment to Cleveland. The Southern iron market is about as dull as the Northern. Most of the Southern furnaces are offering iron for the last half delivery at $10.50, Birmingham, but consumers generally are showing no interest. An inquiry is pending from a leading sanitary interest for 500 tons of No. 3 Southern for June and July delivery. The furnace of the Girard Iron Company, Girard, Ohio, has been blown in, but will probably not stay in blast for an extended period. We quote, delivered Cleveland, as follows:

Bessemer	$14.90
Basic	$13.75 to 13.90
Northern No. 2 foundry	14.25
Southern No. 2 foundry	14.85
Gray forge	13.50
Jackson Co. silvery, 8 per cent. silicon	17.55
Standard low phosphorus, Valley furnace	20.50

Coke.—A Cleveland furnace interest which for some time has been buying coke from month to month, has contracted for a heavy tonnage for the last half which it states will be almost sufficient to cover the requirements for that period of its five furnaces now in blast. Prices are weak. Standard Connellsville furnace coke is quoted at $1.75 to $1.85 per net ton at oven for spot shipment. Foundry coke is held at $2.40 to $2.60.

Bolts and Nuts.—Bolt makers are trying to avoid making last half contracts, as they do not want to sell for future delivery at present prices. For current business regular prices are being shaded 2½ to 5 per cent. for desirable orders. Rivets are quiet at 1.55c. for structural and 1.55c. for boiler rivets for round lots. We quote discounts as follows: Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 80 and 5 per cent.; cut thread, 80 per cent.; larger or longer, 75 and 5 per cent.; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer, 75 and 10 per cent; coach and lag screws, 80 and 15 per cent.; square h.p. nuts, blank or tapped, $6.30 off; hexagon h.p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9/16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Finished Iron and Steel.—Specifications continue light, but some of the mill agencies report a slight improvement in current orders. Implement manufacturers continue to sound the market regarding prices for delivery after July 1, and while mills have been trying to defer the making of contracts with this trade it is expected that some of the sellers will open their books very shortly for contracts with the implement makers. While many of the implement manufacturers will not specify by July 1 the entire tonnage they contracted for, it is stated that they are cleaning up their stocks and will have very little material on hand July 1. On that date a year ago their stocks were quite large. In structural lines a local manufacturer has an inquiry out for 20,000 tons of structural steel for export to Canada, but there seems to be some uncertainty as yet whether the proposed work which is the basis of this inquiry will be placed. In building lines some new work is pending, but no new inquiries have developed and business is slack with local fabricators. Steel bars and structural material are firm at 1.15c. Pittsburgh, but plates are weaker and are being quoted at 1.10c. to 1.12½c., although most mills are adhering to 1.15c. Eastern mills are now meeting the 1.15c. price on boiler plates. Sheets are not active or firm and sales are mostly for carload lots or less. Recent prices on galvanized sheets are not being maintained, some quotations being made at 2.80c. for No. 28. Black sheets are generally quoted at 1.85c. for No. 28 and blue annealed at 1.35c. for No. 10. The demand for bar iron is very dull and both local mills are shut down. We quote iron bars at 1.20c. Cleveland. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Old Material.—The condition of the scrap market has become more unsatisfactory. Cleveland mills are not buying and Youngstown mills with possibly one exception are out of the market. Consumers are taking shipments on contracts in very limited quantities. Prices are weaker. Quotations on several grades have declined 25c. a ton and other quotations are largely normal. Heavy melting steel is quoted at $11.50 to $11.75 Youngstown delivery. We quote delivered Cleveland as follows:

Per Gross Ton

Old steel rails, rerolling	$11.50 to	$12.00
Old iron rails	13.00 to	13.50
Steel car axles	15.00 to	15.25
Heavy melting steel	10.00 to	10.25
Old carwheels	11.25 to	11.75
Relaying rails, 50 lb. and over	23.00 to	25.00
Agricultural malleable	8.50 to	9.00
Railroad malleable	10.25 to	10.50
Light bundled sheet scrap	7.50 to	8.00

Per Net Ton

Iron car axles	$17.25 to	$18.25
Cast borings	5.50 to	6.00
Iron and steel turnings and drillings	5.25 to	5.50
Steel axle turnings	6.75 to	7.25
No. 1 busheling, new	8.50 to	8.75
No. 1 busheling, old	8.00 to	8.25
No. 1 railroad wrought	9.50 to	10.00
No. 1 cast	10.50 to	10.75
Stove plate	7.50 to	8.00

Birmingham

BIRMINGHAM, ALA., May 25, 1914.

Pig Iron.—The market last week showed more signs of real improvement than in months prior to that time. Sales were larger, inquiries were brisker and transactions were made without concessions under the prices prevailing the past several weeks. To illustrate: One company sold 2000 tons in one day in lots from a carload up to 750 tons, in Southern territory, at prices ranging from $10.50 and $10.75 spot to $11 for third quarter. On the same day and the day before another sold 3000 tons largely for delivery in Cincinnati, St. Louis and Chicago territory around $10.75, it is claimed. Carload lots were sold for $11 spot delivery. Probably over 10,000 tons was sold during the latter part of last week. The feature was the resumption of business in competitive territory at prevailing prices. It is admitted that $10.50 is the spot price for large quantities, but nothing lower seems to have been done anywhere. The tone of Southern iron circles has distinctly improved, especially in view of the fact that the purchases were not below long held levels. The volume of business is not such as to predicate assurance of a better market but is sufficient to indicate one, and inspires a reasonable degree of optimism. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$11.00 to $11.50
No. 2 foundry and soft	10.50 to 11.00
No. 3 foundry	10.00 to 10.50
No. 4 foundry	9.75 to 10.25
Gray forge	9.50 to 10.00
Basic	10.25 to 10.75
Charcoal	23.25 to 23.75

Cast-iron Pipe—Southern cast-iron pipe makers do not report the improvement in trade indicated in other sections. Operations are said to be on a 50 to 60 per cent. basis, with orders sufficient only to take care of that. Sanitary pipe manufacturers report better conditions than makers of water pipe. The American Cast Iron Pipe Company, Birmingham, has installed equipment for the manufacture of 16-ft. pipe, 4 in. in diameter and will soon be prepared to make pipe of that length of larger bore. The Beggs Mfg. Company has begun operation of a plant manufacturing cast-iron culvert pipe. We quote, per net ton, f.o.b. manufacturers' yards, as follows: 4-in., $20.50; 6-in. and upward, $18.50, with $1 added for gas pipe.

Coal and Coke.—The feeling in the coal market is better although trade has not especially increased in volume. Some domestic mines are still shut down. However, prospective business, as indicated by inquiries, seems to justify the better feeling. Coke has not improved, and even the smaller output finds a market with difficulty. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.70 to $3; foundry, $3 to $3.30.

Old Material.—While the market is slow, dealers are inclined to buy more freely in the hope of larger business in the near future. Light cast and stove plate have been easy sellers. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$14.50 to $15.00
Old steel axles	14.50 to 15.00
Old iron rails	13.00 to 13.50
No. 1 railroad wrought	10.00 to 11.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	9.00 to 10.00
No. 2 country wrought	8.00 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	9.50 to 10.00
Standard carwheels	10.50 to 11.00
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, MO., May 25, 1914.

Pig Iron.—Quite a number of purchases has been reported. The largest was for 3000 tons of basic bought by a local steel company, bringing up its total within the past two weeks to 24,000 tons, all Northern iron. Another purchase was of 500 tons of coke carwheel iron for a car plant. Other purchases aggregate possibly 3500 tons all told. The sources indicate to furnace representatives that the buying movement is at least showing signs of starting.

Coke.—An inquiry for 30,000 tons of furnace coke from a lead smelter has come into the market. The chief sale of the week was about 1500 tons of foundry coke to a car plant. By-product was taken, the quotation showing a concession from the beehive figures. By-product coke is now obtainable here at $5.20 per net ton delivered, while Connellsville coke, at $2.50 at oven for 72-hr. coke, or $5.30 St. Louis. A considerable number of foundry coke contracts made at $2.75 are nearing expiration. It is not likely they will be closed until close to July 1.

Finished Iron and Steel.—The largest single transaction of the week was one involving 200 tons of plates to be used by a local fabricator on a Panama Canal contract. Other transactions aggregate larger than for some weeks. Purchases from warehouse are increasing somewhat, and track fastenings are in better request for repair work, etc.

Old Material.—Dealers believe that the bottom has been reached, old material being held at the low prices quoted by the heavy quantities being thrown on the market by the railroads. Lists out include 3400 tons from the Illinois Central, St. Louis delivery; 3000 tons from the Frisco and 300 tons from the Missouri, Kansas & Texas. Steel scrap and foundry grades are being taken in very light quantity. Some dealers complain that customers under contract are penalizing dealers by charging back demurrage, etc., on deliveries actually due. Some material is being taken by dealers at their own prices to lay down in yards against an advance. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton

Old iron rails	$10.50 to $11.00
Old steel rails, rerolling	10.50 to 11.00
Old steel rails, less than 3 feet	10.00 to 10.50
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.50 to 11.00
No. 1 railroad heavy melting steel scrap	9.75 to 10.25
Shoveling steel	7.75 to 8.25
Frogs, switches and guards cut apart	9.70 to 10.25
Bundled sheet scrap	4.50 to 5.00

Per Net Ton

Iron angle bars	$10.00 to $10.50
Steel angle bars	8.00 to 8.50
Iron car axles	16.75 to 17.25
Steel car axles	11.75 to 12.25
Wrought arch bars and transoms	11.25 to 11.75
No. 1 railroad wrought	7.75 to 8.25
No. 2 railroad wrought	7.25 to 7.75
Railroad springs	8.25 to 8.75
Steel couplers and knuckles	8.50 to 9.00
Locomotive tires, 42 in. and over, smooth	9.00 to 9.50
No. 1 dealers' forge	7.25 to 7.75
Mixed borings	3.25 to 3.75
No. 1 busheling	7.00 to 7.50
No. 1 boilers, cut to sheets and rings	5.25 to 5.75
No. 1 cast scrap	9.00 to 9.50
Stove plate and light cast scrap	7.50 to 8.00
Railroad malleable	7.00 to 7.50
Agricultural malleable	6.50 to 7.00
Pipes and flues	5.00 to 5.50
Railroad sheet and tank scrap	5.25 to 5.75
Railroad grate bars	6.75 to 7.25
Machine shop turnings	4.25 to 4.75

Boston

BOSTON, MASS., May 26, 1914.

Old Material.—The dealers report continued extreme dullness. They now expect little revival before fall. Transactions are few and small at the prices that have prevailed for several weeks. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$8.25 to $8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.25 to 13.75
Old iron axles	21.25 to 21.75
Mixed shafting	12.00 to 12.25
No. 1 wrought and soft steel	9.00 to 9.25
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	7.50 to 7.75
Cotton ties (bundled)	6.00 to 6.25
No. 2 light	3.75 to 4.25
Wrought turnings	5.00 to 5.50
Cast borings	5.00 to 5.50
Machinery, cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	5.25 to 5.50
Cast-iron carwheels	11.00 to 11.25

Buffalo

BUFFALO, N. Y., May 26, 1914.

Pig Iron.—A little more inquiry is noted, a considerable portion being offers at figures somewhat under quotations made by furnacemen. This is the status usually reached when after long waiting actual orders begin to develop. A disposition is noticeable on the part of producers to waive the silicon differentials to some extent to facilitate securing business. Orders taken for the week amount to between 15,000 and 20,000 tons, all grades, for third quarter and last half delivery, principally for third quarter. A considerable portion booked is for points outside of the district naturally tributary to this center. Consumers in this vicinity report exceedingly dull conditions. There is a continued dropping off in consumption and some melters have been obliged to lay off temporarily a considerable portion of their shopmen. While producers have not altered their scale of prices to any great extent there have been some modifications. The schedule below reflects the price situation so far as it has been possible to ascertain it, for third quarter and last half delivery, f.o.b. Buffalo:

No. 1 foundry	$13.75 to $14.00
No. 2 X foundry	13.25 to 13.75
No. 2 plain	13.00 to 13.25
No. 3 foundry	13.00
Gray forge	13.00
Malleable	13.25 to 13.75
Basic	13.50 to 14.00
Charcoal, regular brands and analysis	15.75 to 16.75
Charcoal, special brands and analysis	20.50

Finished Iron and Steel.—There is quite a marked increase in specification as compared with the first two weeks of the month. Most mills and agencies report a fair total of orders for prompt shipment in bars, small shapes and structural material. No orders sufficiently large have been negotiated to test the market, consequently no prices under 1.15c. Pittsburgh base, have appeared. It is understood that an order for rail joint specialties, approximating 5000 tons, has recently been placed locally. The Lackawanna Bridge Company has 400 and 500 tons of structural steel for the Seneca Iron & Steel Company, this city. Bids were opened Friday for 500 tons for Seneca street viaduct floor reinforcement, Buffalo. The Stroebel Steel Construction Company, Chicago, was low bidder. Bids are to be taken this week for the Model Theater, Buffalo, 100 tons.

Old Material.—Some quiet buying has been going on in the last two weeks by some of the large consumers. Turnings and borings particularly are in active demand. Prices for the week have not been quotably changed and are as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$10.00 to $10.50
Low phosphorus steel	14.50 to 15.00
Boiler plate sheared	11.50 to 12.00
No. 1 railroad wrought scrap	11.00 to 11.50
No. 1 railroad and machinery cast	11.50 to 12.00
Old steel axles	12.75 to 13.25
Old iron axles	21.50 to 22.00
Old carwheels	11.50 to 12.00
Railroad malleable	10.25 to 10.75
Machine shop turnings	5.25 to 5.75
Heavy axle turnings	7.50 to 8.25
Clean cast borings	6.00 to 6.50
Old iron rails	15.00 to 15.50
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	7.50 to 8.00
Bundled sheet scrap	6.25 to 6.50
No. 1 busheling scrap	8.25 to 8.75
No. 2 busheling scrap	5.75 to 6.25
Bundled tin scrap	10.50

New York

NEW YORK, May 27, 1914.

Pig Iron.—New inquiry has fallen off. A large Connecticut foundry is in the market for 4000 tons, about equally divided between No. 1 and No. 2 plain iron, or silicon above 2.75 and 1.50 per cent. respectively. Second half deliveries are asked. In New Jersey half of the 3000 tons called for in a recent inquiry has been bought in the past week, eastern Pennsylvania furnaces taking the business. The iron for segments for the new East River tunnels is interesting a number of furnace companies, now that the general contract has been let jointly to Booth & Flynn, Pittsburgh, and the O'Rourke Engineering Company, of New York. The segment tonnages for the two tunnels are put at 38,000 and 36,000 tons respectively. It is stated that the pig iron quotations on which the successful bids for the general contract were based represent $1.20 advance over today's pig iron market and that the expectation is that this can be reduced materially when actual contracts for segments and pig iron are let. Pig iron deliveries begin five months hence and extend over two and a half years. There has been some effort to arrange a sliding scale contract for the pig iron. Five or six prospective bidders for the segments are named, including two in the Lehigh Valley, one of which has its own blast furnaces. Pig iron prices have softened somewhat. An undeniable fact in the situation is that the falling off in the business of foundries of all classes has not been arrested. The iron they bought in December and January, which it was expected would be used up in the first half of the year, will last from three to five months longer. A $13 quotation on No. 2 X Buffalo iron is still heard in New England, indicating an unexpected persistence of resale iron. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $15 to $15.25; No. 2 X, $14.65 to $15; No. 2 plain, $14.40 to $14.75; Southern iron, $15 to $15.25 for No. 1 and $14.75 to $15 for No. 2.

Ferroalloys.—Business continues to be confined to small lots in both inquiries and sales, either of 80 per cent. ferromanganese or 50 per cent. ferrosilicon. The price of both the English and German manganese product is still $38, seaboard. Ferrosilicon is quoted at $71 to $73, Pittsburgh, according to quantity asked for.

Finished Iron and Steel.—Prices are nominal. The general run of new business in the leading lines of finished material is going at 1.15c. and 1.20c., Pittsburgh basis, but any volume above the average results usually in some shading. Recurring evidences there are of the selling departments giving consideration now to fractions of the dollar per ton in making quotations just as, under all conditions, the operating departments consider economies in the same detail. The structural market is in a lull; some large users of plates are feeling for quotations for the last half; an offer to supply bars in an amount less than 100 tons at 1.12½c. Pittsburgh basis was unsuccessful in getting the order; extras for twisting reinforcing bars are not so often exacted; business in bar iron has brightened, though common bar iron has gone as low as 1.07½c. at mill, a part of the betterment lying in further purchases of track accessory products by the railroads. Some bars and small angles are now on the ocean from German mills for delivery to jobbers. Outside of further subway work, on which bids will be taken next month covering perhaps 20,000 tons, little new structural work of size is noted except the Chesebrough Building, New York, involving over 1000 tons. Some additional car business has been closed, and word of the award of 3000 cars for the Chicago & Northwestern to the American Car & Foundry Company and 107 passenger cars for the Union Pacific to the Pullman Company came too late to be included in last week's report. The American Car & Foundry Company has also taken 250 Hart ballast cars for the Chicago & Northwestern, 100 Hart ballast cars for the Kansas City Southern, and, it is understood, 200 Rodgers cars for the Missouri, Kansas & Texas. The Havana Central has increased its inquiry by 150 flat cars, making the total about 400 cars all told. We quote mill shipments of steel bars at 1.15c. Pittsburgh, or 1.31c. New York; plates and structural, 1.10c. to 1.15c. Pittsburgh, or 1.26c. to 1.31c., New York, and iron bars at 1.22½c. to 1.27½c., New York. For lots from store we quote iron and steel bars at 1.80c. to 1.85c., New York, and plates and shapes, at 1.85c. to 1.90c.

Cast-Iron Pipe.—On very short notice, the city of Fall River, Mass., opened bids yesterday morning on 450 tons of 36-in. Cambridge, Mass., will open bids June 3 on 200 tons of small sizes. No other municipal lettings of importance are in sight in this territory. Quite numerous inquiries are being received from Canada. On June 1 Stamford, Ont., will open bids on 330 tons, while St. John, N. B., is asking for bids on 500

tons of 4 to 12 in. Considerable private buying is in progress, and the outlook is steadily becoming more favorable to volume of business. Competition, however, continues sharp and some of the business now going must certainly be taken below cost. The successful bidder on 2500 tons of 30-in. for Perth Amboy, N. J., May 20, is understood to have named about $18, delivered. It would be unusual for conditions of this kind to continue long. Carload lots of 6-in. are to be had at $20.50 to $21, per net ton, tidewater.

Old Material.—The market continues almost lifeless. No transactions are reported in steel scrap, while very little is being done in any kind of rolling-mill stock or cast scrap. Old carwheels are in such abundant supply that the price is very weak, while concessions are easily had on cast scrap. Notwithstanding the unsatisfactory condition of business, a hopeful feeling prevails among dealers who express confidence that a turn for the better is nearly due. Dealers quote as follows, per gross ton, New York:

Old girder and T rails for melting	$8.00 to	$8.50
Heavy melting steel scrap	8.00 to	8.50
Relaying rails	21.50 to	22.00
Rerolling rails	10.00 to	10.50
Iron car axles	17.50 to	18.00
Steel car axles	11.75 to	12.25
No. 1 railroad wrought	10.00 to	10.50
Wrought-iron track scrap	9.00 to	9.50
No. 1 yard wrought, long	8.50 to	9.00
No. 1 yard wrought, short	8.00 to	8.50
Light iron	3.25 to	3.50
Cast borings	5.75 to	6.00
Wrought turnings	5.50 to	5.75
Wrought pipe	8.00 to	8.25
Carwheels	10.00 to	10.50
No. 1 heavy cast, broken up	10.50 to	11.00
Stove plate	7.50 to	8.00
Locomotive grate bars	6.00 to	6.25
Malleable cast	7.25 to	7.75

British Trade Still Quiet

Sharp Freight Cut to Far East—France and Belgium Undersell Germany on Sheet Bars

(*By Cable*)

LONDON, ENGLAND, May 27, 1914.

The market is very quiet, but a slightly more hopeful feeling prevails on the prospects of the German steel situation improving. Freight rates to Japan, China and the Straits have been cut sharply, which may help business. The United States Steel Corporation has booked 35,000 tons of steel rails for Australia. The German Steel Works Union offers sheet bars for October-December delivery at 78s. ($18.97), f.o.b. Antwerp, but France and Belgium are taking orders c.i.f. Newport, England, at 79s. 6d. ($19.34). The number of furnaces in blast in Scotland, Cleveland and Cumberland is 167, against 168 last week. The stocks of pig iron in Connal's stores are 88,853 gross tons, against 92,268 tons a week ago. Receipts of tinplates at Swansea the past week were 130,000 boxes and shipments 123,000 boxes; stocks are 275,000 boxes. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 4½d. ($3.01).

The following prices are per ton of 2240 lb.:

Cleveland pig-iron warrants (Tuesday), 51s. ½d. ($12.45), against 51s. 4½d. ($12.50) a week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 51s. 9d. ($12.59), against 51s. 7½d. ($12.56) a week ago.

Hematite pig iron, f.o.b. Tees, 61s. ($14.84), against 61s. 3d. ($14.90) a week ago.

Sheet bars (Welsh), delivered at works in Swansea Valley, £4 10s. ($21.89).

Steel bars, export, f.o.b. Clyde, £5 15s. ($27.98).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 12s. 6d. ($27.37).

Steel ship plates, Scotch, delivered local yards, £5 15s. ($27.98), against £5 17s. 6d. ($28.59) a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 15s. ($42.58).

Steel rails, export, f.o.b. works port, £5 15s. ($27.98), against £5 12s. 6d. ($27.37) a week ago.

The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.:

German sheet bars, f.o.b. Antwerp, 78s. ($18.98).

German 2-in. billets, f.o.b. Antwerp, 73s. ($17.75).

German basic steel bars, f.o.b. Antwerp, £4 4s. to £4 5s. ($20.44 to $20.69), against £4 2s. to £4 3s. ($19.95 to $20.19) a week ago.

German joists, f.o.b. Antwerp, £5 2s. to £5 5s. ($24.82 to $25.55).

Freight rates from Antwerp to New York, Boston, Philadelphia and Baltimore, per 1000 kilos (2204 lb.), are about as follows: Billets, blooms and bars, up to 20 ft., 9s. to 10s. ($2.19 to $2.43). Iron and steel sheets, 11s. to 12s. 6d. ($2.68 to $3.04). Beams up to 30 ft., 12s. 6d. ($3.04).

Iron Market Lifeless—Large French Tonnages Offered at Low Prices—Pig Iron Unchanged

(*By Mail*)

LONDON, May 15, 1914.

The iron and steel markets of the United Kingdom remain in a condition of suspended animation. Conditions might be worse, but that is very little consolation just at present. Were it not for the deplorably bad situation on the European continent the British market might wear a moderately cheerful air, but the very depressing state of things in Belgium and in Germany, and the unabated pressure of material of all kinds from those quarters quite take all the starch out of the market. The French works are still the main operators when it comes to a question of cutting prices in order to get business and it is highly significant that whereas formerly they would only sell small lots of semi-finished steel, 500 to 1000 tons of sheet bars or billets, they are now prepared to take much larger quantities. A line of 10,000 tons of French sheet bars are being offered now to Newport at 81s. ($19.71) c.i.f. and it is doubtful if any consumer will pay the price in view of the fact that smaller lots have been done at 80s. ($19.47) c.i.f. Belgian and French sheet bars are also offered c.i.f. Middlesbrough at 80s. ($19.47), and 2-in. billets at 75s. 6d. ($18.37) c.i.f. French heavy slabs have been sold at below 69s. ($16.79) f.o.b. and there really seems to be no bottom to the market.

Conditions are abnormal, however, and when this is the case it cannot be long before there is a change. This seems to be shaping itself now, for there is a movement on foot in Germany to bring about the allotment syndication of B products. These products (bars, plates, tubes, etc.) were included in the old Verband, but were omitted from the new one owing to the impossibility of reconciling the differences between the works. Meetings are now being held in Germany to see if something cannot be done to end the present deplorable conditions. It is quite possible that these will succeed.

Meantime there is alarming competition for all classes of finished steel. London merchants are offering basic steel bars at 94s. ($22.87) c.i.f. Japan and India. This looks like being a most dangerous game to play for allowing for the freight it means a works' price of about 78s. ($18.98) f.o.b. But the merchant has to make his profit, and possibly there is some secret freight arrangement at the bottom of the offers. All efforts to ascertain whether anything of the kind is in existence now have been unsuccessful and the market is disposed to regard the selling as a somewhat hazardous policy. The chief people who are doing it are new in this branch of the trade.

The pig-iron situation does not alter. Cleveland pig iron production is manifestly insufficient to meet the demands, if the stock returns are to be relied upon as reflecting the visible supply, but it is possible that makers hold something in reserve. The quantities in the warrant stores are going down from week to week and there seems to be a very definite attempt on foot to kill the speculative iron market. General buying remains poor, although this week a few small lots of foundry iron have been sold for Japan and Australia—business quite in the usual course of events.

The muddled policy of the steel makers in connection with their attempt to compel British users to use only British steel has had the result at the eleventh hour of impelling a reduction in the price of ship plates. At a conference between the English and Scottish steel associations, held a few days ago, it was decided to reduce the export price of ship plates 10s. ($2.43) a ton to £5 15s. ($27.98), less 3 per cent. f.o.b. Apparently it was useless to alter the home price, for consumers had weeks ago booked heavily in German plates at much below British rates and the step was merely one of retaliation. It is very doubtful whether any useful purpose will be served by the move. The Clyde output of new ships for April was 30 vessels of 54,000 tons, making 153,000 tons for the four months of 1914, against 230,000 tons last year.

Germany Getting More Hopeful

Expectations of Stronger Combinations Bringing Better Conditions

BERLIN, May 14, 1914.

As negotiations have now been taken up looking toward prolonging existing trade combinations in finished products and forming new ones where none exist, the price tendency is somewhat steadier, pending the outcome of these efforts. It is even reported that some of the big western companies are demanding higher prices for steel bars than had latterly been ruling. It is also reported that a better demand for bars has sprung up in view of the efforts to organize the trade. That the downward movement in export prices has not yet run its course is indicated by the fact that the price of German steel bars fell about a week ago from 84 to 85s. ($20.44 to $20.69) to 83s. ($20.20), and rivet bars from 87 to 85s. ($21.17 to $20.26), on board ship at Antwerp. Belgian export prices had a further drop of about 1s. (24c.) last week, namely, steel bars to 80 to 81s. ($19.47 to $19.71), iron bars to 87s. ($21.17), soft steel rods to 90s. ($21.90) for ordinary dimensions, and still lower prices for larger ones. Thin plates fell to 100 to 102s. ($24.33 to $24.82), and heavy ones to 92 to 93s. ($22.39 to $22.63).

Work on matters of organizations in finished products was taken up by the Steel Works Union at Düsseldorf yesterday. The manufacturers of steel bars first held a meeting and discussed the situation. It is reported that the works now show a more pronounced willingness to take part in an organization, as the ruinous prices of the past few months have amply demonstrated the necessity of getting together. The makers of bars were extensively represented, and concerns that were not represented sent letters indorsing the movement. Committees were appointed to work out details, and another meeting was appointed near the end of the month. It was decided to reverse the order of business hitherto followed in the various efforts to organize the bar trade. Instead of leaving the question of quotas to be taken up after all the other details shall have been agreed upon, it was decided first to push a decision as to quotas. It is proposed to select twelve months between January 1, 1912, and April 30, 1914, and make their production the basis for the quotas of the individual companies. It is reported, however, that Thyssen, Gelsenkirchen and several other concerns having building plans in view object to this way of making allotments.

The wire and rod interests also had a conference yesterday and reached the unexpected decision to prolong the rod association till the end of September, whereas it was expected to lapse at the end of June. It was necessary to take prompt action, as, under the previous prolongation it had been agreed that the individual producers would have the right to begin taking orders on their own account on May 16, provided an agreement to make a further prolongation should not have been reached previously. Hopes are now entertained that the organization will be extended to include wire and wire nails, as had been made an indispensable condition by several important works for the continuation of the association. An agreement as to quotas was even reached last night. None of the older concerns get an increased allotment except Deutsch-Luxemburg and Hoesch, which get a corresponding increase for their mills to run on finished products. The new organization is to take over the arrangement, previously mentioned in the correspondence, of six big producers of rods with 35 wire mills. The conferences are continuing today to decide what finished products shall be embraced in the organization. The fate of this organization will finally depend upon the efforts making to organize the other sections of the finished trade. The agreement is made conditional upon the success of those efforts.

A meeting was also held at Düsseldorf today for organizing the plate trade. Nearly all the works that count for anything in the trade were represented, and a lively interest in the project was manifested. It is proposed to include both heavy and light plates under the proposed arrangement. Committees have been appointed to gather and adjust allotment claims. Quotas will be fixed after the same methods as already described above in reference to bars. The toughest work before the committees is to reach a satisfactory understanding with the works which have enlarged their producing capacity within the past few years, or are still doing so.

The tube manufacturers will also hold another conference next week to try again to form an organization. The success of these efforts, it is said on all sides, will depend upon the course of the Gutehoffnungs-Hütte and Deutsch-Luxemburg. Both are planning the construction of tube works; and unless they can be persuaded to give up such projects it is believed that no organization can be formed. In view of the pronounced prostration of this section of the trade the existing works have every reason to exert themselves to their utmost to secure a combination which shall put an end to the present ruinous price-cutting.

The Steel Works Union will take up, at its regular monthly meeting about the end of this month, the question of fixing prices for the September quarter. Consumers are pointing to the fact that there has been no reduction in the prices of semi-finished products since last October, whereas all finished products have fallen heavily since then; in view of this situation they are trying to convince the union that a reduction is now in order. If no general reduction is made they hope, at least, to obtain an increase of the drawback on exported steel goods.

Metal Market

NEW YORK, May 27, 1914.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
May	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
20	14.37½	14.12½	33.00	3.90	3.80	5.10	4.95
21	14.37½	14.12½	33.15	3.90	3.80	5.10	4.95
22	14.37½	14.12½	33.20	3.90	3.80	5.10	4.95
23	14.37½	14.12½	.....	3.90	3.80	5.10	4.95
25	14.37½	14.12½	33.25	3.90	3.80	5.10	4.95
26	14.37½	14.12½	33.25	3.90	3.80	5.10	4.95

Copper is quiet and the quotation for electrolytic is unchanged. Tin has been more active and prices are a little higher. Lead is dull and weaker. In spelter there has been a little more interest in prompt shipments. Antimony is weaker under pressure to sell.

New York

Copper.—The market has been quiet for days and features of interest are difficult to find. Purchases are small and when they are made are usually based upon immediate need. An illustration of the attitude of consumers is afforded by the replies of consumers of Lake copper who were approached with an offer. One said he had enough on hand to last him three weeks at his present rate of consumption and he saw no reason to buy further ahead, while another had sufficient for June and did not care to go beyond that month in laying in

a supply. Rolled copper products continue to move rather unsatisfactorily as a result of which the base price of hot-rolled sheet copper has again been reduced ¼c. and 19¼c. is now quoted, this being the second reduction in two weeks. Exports are fair, amounting to 29,181 tons this month. Lake copper is quoted at 14.25c. to 14.50c. and electrolytic at 14.12½c., cash, New York, a quotation which might be shaded a few points but not much. The London quotations to-day are £63 7s. 6d. for spot and £64 for futures.

Tin.—Some rather good buying has taken place in the last week, the sales on Monday amounting to about 300 tons for June and July delivery at prices ranging between 33.15c. and 33.30c., according to position. This was the best day of the week. On Wednesday a week ago there was a fair turnover and there would have been still better activity had sellers been willing to name a price, which they were hesitant to do. The attitude of the sellers on that day caused prices to advance from 32.90c. to 33.10c. on comparatively small sales, the aggregate of which probably did not exceed 100 tons. Thursday was dull, but on Friday and Saturday there again was a little business stirring. The New York quotation to-day is 33.25c., while those in London are £149 15s. for spot and £151 15s. for futures. The arrivals this month total 2821 tons and there is afloat 1745 tons.

Lead.—A somewhat weaker tone is evident, but prices are unchanged. The attitude of consumers is one of waiting. About the best inquiry of the week was one for 1000 tons for June and July delivery in New England which is understood to have been placed. The New York quotation is 3.90c. and that at St. Louis, 3.80c.

Spelter.—Prompt delivery metal has been in a little better demand, otherwise the market is without change and quiet at 5.10c., New York, and 4.95c., St. Louis.

Antimony.—Under pressure to sell, which is unexplained except for the probability that stocks have been increasing, Cookson's is lower at 7.20c. to 7.25c. for spot metal, while futures can be had at a low figure. Hallett's is quoted at 6.80c. to 7c. and other grades range from 5.75c. to 6.50c.

Old Metals.—The market continues quiet. Dealers' selling prices are nominally unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	13.50 to 13.75
Copper, heavy and wire	13.00 to 13.25
Copper, light and bottoms	12.25 to 12.50
Brass, heavy	9.00 to 9.25
Brass, light	7.50 to 7.75
Heavy machine composition	12.00 to 12.25
Clean brass turnings	8.75 to 9.00
Composition turnings	11.00 to 11.25
Lead, heavy	3.65
Lead, tea	3.40
Zinc scrap	4.25

Chicago

MAY 25.—Featureless, and lacking indication as to whether its future course is to be up or down, the nonferrous metal market recorded a practically unchanged level of prices. Sales of all of the metals were limited in quantity and almost entirely for prompt shipment. We quote as follows: Casting copper, 14.25c.; Lake copper, 14.50c. to 14.75c. for prompt shipment; small lots, ¼c. to ⅛c. higher; pig tin, carloads, 34c.; small lots, 36c.; lead, desilverized, 3.85c., and corroding, 4.10c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5c. to 5.10c.; Cookson's antimony, 9.50c. for cask lots; other grades, 8c.; sheet zinc, $7, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 11.50c.; copper bottoms, 10.25c.; copper clips, 10.75c.; red brass, 10.75c.; yellow brass, 7.50c.; lead pipe, 3.30c.; zinc, 3.50c.; pewter, No. 1, 23c.; tinfoil, 26c.; block tin pipe, 29c.

St. Louis

MAY 25.—Metals, though somewhat lower and weaker for a few days, began to firm up and are now stronger. Lead closed at 3.82½c. with heavy sales; spelter, 5c.; Lake copper, 14.75c.; electrolytic, 14.60c.; tin, 33.50c. to 33.65c.; Cookson's antimony, 7.60c. In the Joplin ore market prices were well maintained for zinc blende which sold on a basis range of $37 to $40.50 per ton for 60 per cent. and $43.50 the top price. Calamine was more than ordinarily strong, with the basis range for 40 per cent. $22 to $23, and the top settlement at $27. Lead ore was steady at $46 for 80 per cent. The average value of the week for the whole Joplin district was: Zinc blende, $37.10; calamine $21.65, and galena, $45.54. Miscellaneous scrap metals are quoted as follows: Light brass, 6c.; heavy yellow brass, 8c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 11c.; zinc, 3c.; lead, 3.25c.; tea lead, 3c.; pewter, 23c.; tinfoil, 28c.

Iron and Industrial Stocks

NEW YORK, May 27, 1914.

Despite extreme dullness, prices of stocks have been inclined to firmness. The market is still waiting for some development, the most important of which is the announcement by the Interstate Commerce Commission of its decision relative to the advance asked on Eastern freight rates. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	11 - 11⅞	Pressed Stl., com.	42⅞ - 44⅜
Am. Can, com.	27⅛ - 28⅛	Pressed Stl., pref.	102¼ - 102½
Am. Can, pref.	90 - 91⅜	Ry. Spring, com.	28½ - 29⅜
Am. Car & Fdy., com.	50 - 51	Republic, com.	22⅞ - 23¾
		Republic, pref.	86½ - 87¾
Am. Car & Fdy., pref.	117⅜ - 118	Rumely Co., com.	11⅜ - 14½
		Rumely Co., pref.	30 - 34½
Am. Loco., com.	32¼ - 32½	Sloss, com.	30
Am. Loco., pref.	98¼	Sloss, pref.	85
Am. Stl. Fdries.	32 - 32¼	Pipe, com.	9½
Bald. Loco., com.	47½ - 48½	U. S. Steel, com.	61½ - 63⅜
Bald. Loco., pref.	108⅝ - 109	U. S. Steel, pref.	109¾ - 110
Beth. Steel, com.	40¾ - 43	West'g'hse Elec.	75⅞ - 78¼
Beth. Steel, pref.	85 - 85¾	Am. Ship, com.	37
Colorado Fuel	27⅝ - 28	Chic. Pneu. Tool.	53 - 54½
Gen. Electric	146¾ - 149¼	Cambria Steel	47¾ - 48¾
Gt. N. Ore Cert.	31½ - 33¼	Lake Sup. Corp.	19 - 19⅜
Int. Harv., com.	105¼ - 107½	Warwick	10¾ - 11
Int. Harv., Corp.	105	Cruc. Steel, com.	15 - 16½
Int. Pump, pref.	18½	Cruc. Steel, pref.	91⅞ - 93
Nat. En. & St., com.	10¾ - 10⅝	La Belle Iron, com.	36⅞ - 39½

Dividends Declared

The New York Air Brake Company, regular quarterly, 1½ per cent., payable June 23.

The General Electric Company, regular quarterly, 2 per cent., payable July 15.

The National Lead Company, regular quarterly, ¾ of 1 per cent., payable June 30.

The Baldwin Locomotive Works, regular semi-annual, 1 per cent. on the common stock and 3½ per cent. on the preferred stock, both payable July 1.

The Warwick Iron & Steel Company will on June 10 make a distribution of $1.67 a share to stockholders of record June 1. The distribution is in accordance with lease to the Eastern Steel Company. Hereafter the regular annual rate of dividend will be 7 per cent., compared with the present rate of 8 per cent., payable semi-annually in May and November. The last dividend payable this month was at the 8 per cent. rate, but the one to be declared in November will be at the new rate of 7 per cent. or 3½ per cent. semi-annually.

The Western Reserve Steel Company, which will build a sheet mill in Warren, Ohio, has established offices in the Stone Building in that city, at which orders for all equipment will be placed. Owing to the fact that men associated with this company have been in business in Niles, Ohio, while the company is taking over the Sykes Metal Lath & Roofing Company, of Niles, there has been some misunderstanding as to whether the new company's offices are located in Warren or Niles.

The Trussed Concrete Steel Company announces that after June 1 its general sales offices will be located at its extensive plant in Youngstown, Ohio, to secure the closer co-operation of all departments. A competent engineering and selling organization will be maintained in Detroit to handle Michigan business.

Boiler Makers and Supply Men in Convention

The eighth annual convention of the Master Boiler Makers' Association and the Boiler Makers Supply Men's Association opened last Monday at the Hotel Walton, Philadelphia, and in the course of the first morning nearly 500 names were registered. The programme provided for a four days' meeting. On the afternoon of Monday the delegates were addressed by Mayor Rudolph Blankenburg of Philadelphia and Ivy D. Lee, chief executive assistant to the president of the Pennsylvania Railroad. At this meeting, T. W. Lowe, president of the Master Boiler Makers' Association, also made an address. Tuesday morning and afternoon were devoted principally to reports on technical subjects.

The delegates were taken by special train yesterday to Coatesville and Parkesburg, Pa., where they inspected the plants of the Lukens Iron & Steel Company and the Parkesburg Iron Company. Luncheon was served and the ladies of the party were entertained at a concert given by the Lukens Iron & Steel Company band. To-day the convention is to be addressed by Henry J. Hartley, past president of the American Boiler Manufacturers' Association and superintendent of the boiler department of the William Cramp & Sons Ship and Engine Building Company, and by John M. Lukens, chief inspector of the bureau of steam engine and boiler inspection, department of public safety, Philadelphia. After the conclusion of business to-day, a visit is to be made to the plant of the Baldwin Locomotive Works.

Diamond Forging & Mfg. Company to Enlarge

The Diamond Forging & Mfg. Company, North Side, Pittsburgh, Pa., has purchased property adjoining its factory for the purpose of building an addition to its drop forging department. Arrangements have been made with the Baltimore & Ohio Railroad to place a private siding on the property. It is the intention to erect a structural steel building, 60 x 140 fet., for the hammershop, and to install 12 additional hammers. They will all be board drop hammers. Every hammer and press will have an individual motor, to reduce operating expenses to a minimum. An electric crane covering the entire shop and extending over the railroad siding will be installed. A new heat-treating building will also be erected.

The company will continue to manufacture its Neverbreak tubular steel whiffletrees in the present factory. Business in this department has grown to such an extent that additional space is necessary, while the drop forging business has steadily increased. The company has been operating day and night, seven days per week for the past year, and now has orders booked that will keep it running to capacity to the latter part of July. In its improvements it is not aiming to have the largest drop forge shop but it proposes to have the best equipped shop of its kind that can be secured. D. M. Smith is president; G. Wickersham, general manager, secretary and treasurer; W. D. Henry, chairman of the board of trustees.

The Standard Scale & Supply Company, Pittsburgh, Pa., calls attention to an error appearing in the item entitled "An Export Transaction in Scales," which was printed in *The Iron Age* of May 14. The statement was made that the company had secured the contract "amounting to $17,000," but it should have said that bonuses were earned in excess of the contract amounting to $17,000. The price named in the contract has not been made public.

At the meeting of the Newark Foundrymen's Association to be held June 3, W. S. S. Coleman, an insurance expert, will speak and the association will discuss the feasibility of organizing a mutual insurance company to protect its members under the New Jersey employers' liability and workmen's compensation law.

The Stock Converter Company has discontinued the office maintained at 401 Ellicott Square, Buffalo, by G. J. Stock, managing director, and all communications are now to be addressed to the home office at No. 1 North Road, Darlington, England.

New York State Steel Plant Sold

The property of the New York State Steel Company, Buffalo, N. Y., was sold at the City Hall Monday, May 25, to James S. Thompson, who represented a committee of prominent business men whose intention it is to reorganize and greatly develop the company. The plant, including real estate, shops and equipment, is valued at nearly $4,000,000. The reorganization or purchasing committee consists of James S. Thompson, Frank B. Baird, William H. Gratwick, Howard Kellogg and Harrison Nesbitt, representing the holders of the first mortgage bonds, nearly all of which had been deposited with this committee. The sale was in foreclosure proceedings under the mortgage.

Spencer Kellogg organized the company about 10 years ago. Early difficulties arising from harbor improvements caused trouble, which resulted in a reorganization, the company continuing until about a year ago, when court proceedings to wind up the business were started, the receivers being F. Ernest Porter, T. H. Wickwire, Jr., and Alfred L. Becker.

It is reported that the plant will be refitted and operations resumed as soon as possible. Harbor and river improvements having progressed sufficiently to greatly facilitate the shipment of ore to the plant, future difficulties will be minimized. Formerly iron ore could come only by rail. The reorganization committee purchased also the locomotives, cranes, iron ore and general equipment at a receivers' sale after the conclusion of the foreclosure sale.

Plans of the former owners regarding the building of new finishing mills will probably be carried to completion in the development of the business. Formerly only pig iron and steel billets were produced.

Revised Amalgamated Scales Proposed

The Amalgamated Association of Iron and Steel Workers, at its convention at Columbus, Ohio, last week, adopted wage scales for puddling and finishing and for sheet and tin-plate mills to be presented later to the manufacturers in conference, and to be effective for the year beginning July 1. The present scale for boiling is based on $5.25 per ton on a 1-cent card, and advances 15 cents per ton for every $1 advance in average prices of bar iron. The scale adopted last week at Columbus is based on $6 per ton for bar iron on a 1-cent card, an advance of 75c. a ton. In the guide 10-in. hoop and cotton tie mills, it was voted that the price for all rounds and squares from 3-16 in. up to ½ in. shall be advanced 10 per cent. above present scale prices. To the present sheet mill scales for sheet and jobbing mills a new footnote was added as follows: Shearing to mean squaring the pack, 16 2-3 per cent. extra for all extra cuts up to 2 cuts, 20 per cent. extra for all extra cuts from 2 cuts to 8 cuts, 25 per cent. extra for all extra cuts over 8 cuts. The base rates in the present tin-mill scale were readopted, and among new footnotes the following: That men working charcoal iron and tin plate mills 5 per cent. above scale prices shall be paid.

As yet no arrangements have been made for conferences between the Western bar iron mills and sheet and tin-plate mills and the Amalgamated Association, but it is probable these will be held in the early part of June. It is very likely the demand of the puddlers for an advance of 75c. a ton for boiling over the present scale, which expires June 30, will be vigorously opposed by the manufacturers.

German Steel Output for Three Months

The tabulated returns of steel production in Germany for the first quarter of 1914 are as follows:

	Metric tons
Basic Bessemer ingots	2,589,411
Acid Bessemer ingots	26,505
Basic open-hearth ingots	1,817,040
Acid open-hearth ingots	96,000
Basic castings	63,125
Acid castings	27,160
Crucible steel	23,667
Electric-furnace steel	23,078
Total	4,665,986

Modern American Blast Furnace Practice

(Continued from page 1340)

the square feet of heating surface per ton per day, and probably per volume of air blown remains greater than is the case at most American furnaces. The so-called forcing is, therefore, not forcing according to our standards.

Distribution of Raw Materials in Blast Furnace*

BY JOHN T. REESE

General Superintendent Northern Furnaces, Republic Iron & Steel Company, Youngstown, Ohio.

The proper distribution of the raw materials in the blast furnace has received the attention of blast furnace men of all time, but the problem cannot be said to have been fully solved even in this scientific age.

There are many things outside of the distributing device itself that can render the distribution faulty. Some of these influences are:

1. Ore sticking, and faulty balance of, the large bell.
2. Side thrust, swinging and improper lowering of the large bell.
3. Wearing of the stock line or change in the stock line due to the breaking or distortion of the protecting devices.
4. Improper location of the downcomer openings, so that stock falls into them causing channels to form below each opening due to segregation of the lumps into columns.
5. Downcomer openings too small in area or too few in number, causing the gas to channel and to carry off a large amount of fines into the downcomer.
6. Carrying the stock line too far below the bell, making the size of the bell too large, and also causing unnecessary breakage of the coke and packing of the stock.
7. Shifting of the furnace top relative to the furnace center, caused by warping, expansion or contraction.
8. Warping and burning of the bell or hopper.
9. Lack of care and watchfulness on the part of the operator.
10. Bad weather conditions.

There are three types of blast furnace tops which are in more or less successful operation.

1. Stationary.
2. Revolving, at top of furnace.
3. Bucket revolved at bottom of furnace.

STATIONARY TOPS

The stationary top can be adapted to either the single or double skip. It usually consists of a receiving hopper, surmounting a cylindrical or elliptical throat with the bottom part drawn in and closed by a small bell. Considerable experimenting must be done to adapt the stationary top to a certain set of conditions. If these conditions are materially changed the arrangement of the top must be modified accordingly. Overtravel and improper dumping of the skip affect distribution. If the central sleeve and rod are used to support the two bells there is a tendency for the fines to remain on the side beneath the skip.

The stationary top has the simplest mechanism, costs less to operate than other mechanical tops and has given successful results. A number of these tops are in use on large furnaces, but the newer furnaces show a marked tendency to adopt one of the other types.

REVOLVING TOPS

Revolving tops are of several kinds, differing principally in the method of discharging the materials upon the large bell. The four leading types are: Brown, Baker-Newman, Roberts, McKee.

The Brown top consists of a chute suspended to the receiving hopper, which is revolved about 86½ deg. by the skip as it returns empty down the incline. The mouth of the chute is closed by a flap door as the large bell opens. Experience with two of these tops on furnaces using entirely different raw materials has shown the following faults: The stock, as it slides through the chute, crowds the side opposite the skip. This occurs in a greater or less degree with every position of the top except when it points directly toward or away from the skip.

Several methods of removing this fault have been tried, such as dumping the skip very slowly, increasing the size of the charge, and narrowing the mouth of the chute; but none of them has overcome it. The trouble may be stopped by causing the material to enter the chute centrally, by introducing a small bell and making a sort of combined Brown-McKee top, or by placing a receiving hopper with conical bottom between the skip and chute. This, however, increases the drop to which the coke is subjected. The advantages of this type of top are its simplicity, lightness of construction and speed of operation.

The Baker-Newman top consists of a receiving hopper with a cylindrical throat closed by a small bell. A distributing or deflecting plate is attached to the bell rod. The bell and plate revolve about 87½ deg. as they move upward and as the skip leaves the top of the furnace. As the top is usually operated the bell and plate are down when the skip dumps its load.

With this top there is less tendency for unequal distribution or separation of lumps from fines. If anything happens to the revolving mechanism of either, however, the furnace must be stopped until repairs are made or filling on one side must be resorted to. Both have the advantage of allowing coke, sand or scrap to be filled at certain points if necessary. Some objections have been raised to the placing of the stock in piles on the large bell instead of in an even ring.

The McKee top consists of a receiving hopper, a cylindrical or slightly conical throat closed by a small bell. In some of these tops an inverted conical apron is introduced below the small bell, which throws the stock toward the apex of the large bell. The method of operation is not the same at all plants, the difference being mainly in the number of skips dumped at certain points of distribution and in the number of points.

REVOLVING BUCKET DEVICE

The Neeland or Duquesne top consists of a cylindrical bucket narrowed at the bottom by a conical section and closed by a small bell. The larry car dumps directly into the bucket, which is revolved to bring the high side of the load on the quarters. It is then hoisted to the top of the furnace where the bucket seats on the gas seal and dumps its contents upon the large bell. Some

*Discussion, substantially in full, of paper by Hermann A. Brassert, read before the American Iron and Steel Institute.

trouble has been experienced at several plants with the small bell that closed the gas seal and a slide has been introduced. The advantage of this slide is that it leaves the seal entirely free for the lowering of the small bell and prevents the bell lever cutting the stock.

The Neeland device removes the revolving mechanism from the top of the furnace, allows the distribution in each bucket to be inspected, and if anything happens to the revolving machinery fairly good filling can be accomplished be leveling the contents of the bucket by hand while repairs are being made.

A number of other devices have been patented and several have been installed but those described have withstood the test of time and are in more or less successful operation. The following table gives a census of the different tops used in the Mahoning and Shenango Valleys at the present time:

Hand filled	16
Stationary	10
Neeland	7
Brown	4
McKee	4
Kennedy revolving	1

The newer installations have been equipped with the Neeland top. At several plants other types of distributors or reflectors have been installed. I refer to the Killeen and McDonald distributors.

The Killeen distributor consists of a stationary apron hung below the hopper, between the inwall and the large bell. The stock strikes the apron causing the fines to be deposited in an annular ring below it while the lumps form a ring next the wall and a column in the center.

The McDonald distributor produces the same result and differs from the Killeen only in that the apron can be raised or lowered as desired and the fines placed near the walls or in an annular ring below the apron. It is claimed that the walls can be kept clean by the use of these distributors.

ADVANTAGE OF SINGLE LARGE BELL

The single large bell still remains the favorite with the vast majority of blast furnace managers. The present tendency is to have a rather large bell, especially for fine ores, depositing the fines close to the walls and allowing the lumps to rebound and roll, forming a comparatively loose column in the center.

The proper size of bell for a given stock line diameter has been worked out from long experience with lake ores, but there is still some difference of opinion. The rule was to allow an annular space of about 2 ft. between the bell and the stock line, but a later rule is to make the bell so that the square of its diameter is equal to or slightly greater than one-half the square of the stock line diameter.

The reasons for the better results with the large bell, in charging fine ores are:

1—Owing to the comparative smoothness of the brickwork and the loosening effect of the friction between the stock and the wall, the gases have a tendency to follow the walls. Placing the fines close to the walls counteracts this.

2—The stock in the center of the furnace travels faster than along the walls, due to the friction against the bricks and to the resistance resulting from the narrowing of the bosh walls, as well as on account of the loose nature of the materials in the central column. So there is a tendency for the fines to work from the walls into the interstices in the central column. This causes the mass to become more nearly of the same permeability throughout and therefore aids the proper distribution of the gases.

The distance below the bell that the stock line is carried has a direct bearing upon the distribution. The greater the distance, within a certain limit, the greater the tendency to deposit the fines toward the walls. The bad effect of too small a bell can sometimes be overcome by dropping the stock line a short distance. Stock line protection is a vital part of good distribution, because wearing of the walls at the stock line or warping of a protecting device can upset the distribution of the best possible top.

Other Discussion

[Written discussions were also presented by Edgar S. Cook, president Warwick Iron Company, Pottstown, Pa., and Richard V. McKay, superintendent, blast furnaces, Pennsylvania Steel Company, Steelton, Pa., but publication of these will have to go over to the next issue.—EDITOR.]

Carbon Steel Company Employees Indicted

An indictment charging conspiracy in January, 1912, to defraud the United States Government was returned at Pittsburgh last week by a grand jury of the United States District Court against five former employees of the Carbon Steel Company: Samuel M. Wetmore, general sales manager and former superintendent, David J. Simpson, Henry Lutz, James E. Lacey and Dennis K. Bullens. The last named was formerly metallurgist. The alleged conspiracy involves nickel-steel plates and draw pins furnished by the company for use in the Panama Canal locks. The men under indictment are alleged to have tampered with samples secured by the Government inspectors for test purposes. President Charles McKnight, of the Carbon Steel Company, has made an official statement regarding this matter, which is as follows:

"I was made president of the Carbon Steel Company in October, 1911, but did not take active charge of the management of the mill until the summer of 1912.

"Some time in June, 1912, I think, my attention was called by one of our employees to the fact that one of the inspectors of the Government claimed to have found some irregularities in preparing test plates for trial. I immediately took up the question with the inspector, but could get no actual proof of any wrongdoing. I followed the matter up until November, 1912, and while I could not get any evidence to indicate that there had been any wrongdoing toward the Government, I did find sufficient cause in connection with the company's own affairs to make me decide to change heads of practically all our departments. This was done during December, 1912, and at the present time we only have in our employ two of the men who are mentioned in the indictment before the grand jury, and these are in minor positions.

"The Carbon Steel Company had no direct contract with the Panama Canal Commission at any time, but was a sub-contractor through the Wheeling Mold & Foundry Company, to whom we sold steel.

"None of this steel was ever returned to us, nor have we ever received any complaints from the Panama Canal Commission that the steel was not what it should be. They did, however, in the summer of 1912, after the accusation was made against our men, refuse to take any more steel on account of the contract.

"It has been our intention to aid the Government in every way possible in this investigation, and in December, 1912, we laid before the Government frankly all the information we had, copies of which are at present in the district attorney's hands.

"Since the change of our management the Carbon Steel Company has spent an amount exceeding $200,000 for new machinery and equipment; has changed the personnel of its management entirely and has had a number of contracts with the United States Government which have been and which are being fulfilled satisfactorily to the Government."

Investment Factor and Sales Policy*

A Striking Presentation of the Low Buying Power of Steel Compared with Other Commodities and the Reasons Therefor

THOMAS J. BRAY.†

I believe that upon consideration it will be agreed by men of experience in the rolling mill and steel industries that the "relative prices" of steel products are at the present time the lowest recorded in the history of the trade. By "relative prices" of steel products is meant, of course, their present selling prices as compared with wages and the prices of various commodities. In other words, the number of hours of labor, the number of bushels of wheat, or tons of coal, that a ton of steel will now buy is less than at any former period.

During the periods of extremely low prices, 1893-1894 and 1895-1898, which old-time steel men always recall when discussing hard times and low profits, the selling price of a gross ton of steel billets would buy, roughly speaking, about 140 hr. of unskilled labor, while now it will buy little more than 100 hr. The selling price of a net ton of merchant bars would buy then about 170 hr. of unskilled labor, while now it will buy about 115 hr. Expressed in terms of mechanical labor, or mining labor, or in coal, or in terms of great commodities like wheat and corn, or in terms of taxes paid by steel companies per ton of steel produced, the same condition holds good, that the relative prices of steel products in this country are now lower than ever before.

This low selling price of steel products not only brings pressure on operating heads to reduce costs but also necessitates, on account of the narrow margin of profit, extreme care in making sales.

It is obvious that under these conditions the fact that tonnage can be taken at the current market price is not a sufficient guide for taking or refusing it, but regard must first be had to the cost of producing the material. The sales manager, or head of the company, or whoever has the last word in deciding day by day the prices to be put on products or the length of time for which contracts shall be made, should have constantly before him complete cost data.

WHAT FACTORS CONSTITUTE COST

For the use of the sales executive the total cost should be made up not only of the cost of material, labor, stores, scrap loss and other items necessary for operating comparison and control, but in addition there should also be included such items as the normal depreciation per ton of finished product, salaries and general expense per ton of finished product and other items which in an operator's cost sheet need not be allocated against the product. In short, the total costs of various products given to the sales executive, to be of use, should be so complete that if tonnage sufficient to give a full operation were sold at those costs the company would be able to pay all charges exclusive of interest on investment.

The importance of the subject of complete costs is my only excuse for the reiteration of matters which no doubt are well taken care of by the accountants of the various steel companies represented here.

In addition to the items just considered, and which I presume are covered in different ways by accountants in furnishing cost data against which sales are made, the sales manager and other officers having to do with selling should also, in considering sales at a narrow margin of profit, take into account the interest on investment per ton of each kind of product manufactured and sold. This was a matter of little importance when the total investment required was small and when the different steps in the process of manufacture from ore to finished steel were undertaken by separate companies and a profit was necessarily had on each step. But with the integration of properties and processes there is a natural tendency to consider only one profit from ore to finished material, and it is obvious that unless this single profit is sufficient to give a fair return on the total investment the result will be, to say the least, disappointing.

To those of us who have had experience in the construction of steel plants and rolling mills during the past twenty years one of the most impressive features has been the progressive increase from year to year in the cost of construction. This, of course, has meant a corresponding increase in the amount of money invested. Not only has the influence of higher wages and generally higher equipment costs made itself felt in higher construction costs, so that the plant built in the early nineties, or even ten years ago, could not be duplicated to-day for its original cost, but changes in processes, in raw materials and a variety of other causes have had their effect in increasing the investment factor.

CONSTRUCTION COSTS PAST AND PRESENT

The typical American steel plant of the decade ending in 1900 may be said to have been an acid Bessemer works, which on account of the then low price for fuel, could be operated economically with a very cheaply built power plant. This fact, together with the simplicity of the process itself, meant a low investment per ton of product produced. Due largely to the decreasing supply of low phosphorus ore the typical American steel plant is now a basic open hearth works. The investment per ton of ingots necessary to carry on the process from pig iron to ingots in a converter plant is about one-fifth of the investment per ton for the corresponding step in an open-hearth steel works, so that the effect of the change of process on the investment factor is easily seen. It is sometimes maintained that inasmuch as the ordinary open-hearth plant uses only, say 60 per cent. to 70 per cent. of a ton of pig iron per ton of ingots, this lessened need for blast furnace capacity (pig iron being replaced by purchased scrap) might be considered as an offset to the higher investment in the open-hearth plant. But in my judgment this factor cannot be considered an offset, as the supply and price of scrap are at least as uncertain at the present time as was the ability to buy, for extended delivery, cheap Bessemer pig iron in the earlier years. The fact that in some cases the duplex process with its high pig-iron consumption has been used, partly because of the uncertain scrap supply and its uncertain price, bears out this thought.

FACTORS INCREASING COSTS OF CONSTRUCTION

Furthermore, leaner ore has its effect on blast furnace tonnage, so that in general, the production of pig iron per cubic foot of blast furnace capacity is being lessened from this cause year by year, although this tendency may not be felt by those having ample supplies of rich ore.

With the increasing cost of fuel have come large increases in investment in the power plants of blast furnaces and steel works. Higher priced fuel has justified fuel economy, and the use of stokers, superheaters, compound engines, condensers, low pressure turbines, gas engines and electric mill drives. These improvements while necessary to combat an increasing fuel cost do not of themselves necessarily increase tonnage, and have a tendency to increase the investment factor per ton of steel produced.

Among other causes which might be mentioned tending to increase this factor has been the "Safety First" movement, improved sanitation, better housing

*Paper read before the American Iron and Steel Institute, New York, May 22.

†President Republic Iron & Steel Company, Youngstown, Ohio.

conditions, etc., all commendable and necessary, but all tending to a higher investment per ton of steel produced.

It is also a fact that the large investments in plants have brought with them and made advisable the investment of money in large reserves of ore and coal, and the equipment that goes with them. Common prudence has dictated that the large investment in modern plants should be backed up by a reserve of raw materials. This was not so necessary in the early days of the steel business, when the plant investment was small and the limits of bodies of desirable ore and coking coal, within reasonable transportation distances from steel producing centers, were not so well defined. Leaner ore has also meant investment in concentrating and washing plants, and as the proportion of ore mined from shafts increases as against that from open pits, larger investments may become necessary because of this fact.

SOME FACTORS HELPING TO REDUCE CONSTRUCTION COSTS

It is true that the ingenuity and organizing ability of the steel maker, engineer and operator have been able to counteract to some extent this increase in investment. Through the growth of individual steel companies, or the combination of small companies to form large ones, a degree of specialization of operations on finished product in various lines is now possible which was impossible under former conditions. With larger tonnages under the control of single organizations, rollings come in sufficient quantity of one size to warrant, to a greater degree than formerly, the installation of special large tonnage mills. This fact together with the elimination of the former arbitrary limitation of output by labor on certain products have been the special causes which have served to offset in a degree the growth of the investment factor.

I believe I have given enough reasons for the consideration of the investment factor by the sales executive, especially in low priced times, like the present. An easy way to handle this question for sales purposes is to work out an investment factor per ton of capacity per year for each product sold, taking into account not only the money invested per ton produced, in real estate, plants, etc., but also the approximate amount of working capital required per ton produced per year for each product sold.

SOME COST CONSTRUCTION ITEMS CONSIDERED

Without attempting to give close figures, which of course differ widely with different conditions, but simply for illustrative purposes, let us consider a modern steel company of moderate size, producing, say, 400,000 net tons of open hearth steel merchant bars and plates per year. Such a concern, if built up under present construction conditions, will probably, if provided with coking coal reserves for 25 years, have an investment in houses, coal shafts, mining equipment, coal reserves and by-product coke ovens of from $7 to $10 per net ton of capacity of finished steel per year. In blast furnaces its investment will be from $8 to $10 per ton per year of finished steel. Its open hearth plant, blooming mill and billet mill will entail an investment of from $13 to $15 per ton per year of finished steel. Its bar mills and plate mills will require an investment of $7 to $8 per ton per year of finished steel; while the working capital required will probably be from $10 to $12 per ton per year of finished product. I hesitate even to guess at the investment in real estate required per ton of finished steel, but it can easily run $1 to $2 per ton per year of finished product; while the consideration of the value of ore in the ground—depending as it does upon so many factors, like quality, cost of mining and transportation—would take a separate paper and for brevity is omitted. If part of the steel produced by the open hearth plant, instead of going into bars or plates, goes into more highly finished products—like pipe, wire, sheets, tinplate, shafting, spikes, or into fabricated structural work—the investment factor per ton per year for those products will be increased, commensurate with the character of the product; or if part of the product is sold in the shape of billets, or sheet bars, the factor will be decreased for those products. In any case, the accountant can work out the investment factor, per ton per year, for each product along the lines indicated, taking into account the working capital required as well as the fixed investment.

While the figures given above are intended merely to be illustrative, they are based on experience, and in the example cited would show that without ore or transportation interests an investment factor of from $46 to $57 per ton per year is indicated. This would mean, taking the average of the two figures ($51.50), that to make 6 per cent. on the actual money invested, a profit above full and complete costs is needed of somewhat more than $3 per ton on each ton of steel sold. Of course, if the interest on investment on money tied up in ore operations and properties per ton of steel produced were added this amount would be still higher.

CONCLUSION

I have tried to bring out briefly the importance of the investment factor in sales policy; but I realize that the stress of competition, the attempt to stimulate business by low prices and the effort to keep operating may at times prevent its consideration. This may be necessary in choosing the lesser of the two evils—that is, of closing down the works, or completely neglecting profits. But I believe that, even in hard times, the constant consideration of this factor together with true costs will at least tend to make the comparative prices of different steel products more in keeping with their relative cost and with the investment necessary to produce the products.

The statement made at the beginning of this paper concerning the relative prices of steel and rates of wages shows that the public has, on the whole, been well served by the steel industry, and that with higher wages, higher taxes, etc., steel prices have not been increased in proportion. There is also a duty to stockholders, and if constant consideration of the investment factor may not prevent ruinous prices for spot business it is hoped that its consideration in sales policy will tend to minimize the extension of these prices over long periods.

Study Costs First and Make Prices Afterward*

BY HARRY D. WESTFALL

Vice-President and General Manager of Sales, La Belle Iron Works, Steubenville, Ohio

A very complete statement has been submitted of new and proper factors in cost distribution; but the subject, if we are generous in our interpretation, has many angles, and the time seems opportune to make at least delicate reference to certain other features of its every-day application. It has doubtless been the experience of many if not all of us, that we have regarded with some alarm the steady and probably permanent increases in producing costs, and I have found at times that a sober, second consideration of what we are doing has frequently helped in making up our minds as to what we should do.

ACCOUNTING DEPARTMENTS NOT FULLY UTILIZED

We all maintain elaborate accounting departments and regard them perhaps as the most necessary unit in our organizations. But, is it not a fact that such important data are too often viewed in the light of comparisons with the previous month, or with other years, rather than in such manner that the sales manager is impressed with the vital influence costs should exercise in the preparation of our price schedules? I

*Discussion, substantially in full, of paper by T. J. Bray, read before the American Iron and Steel Institute, New York, May 22.

venture to assert that we are not getting our full money's worth out of our actual costs and I also contend that if a cost system is to mean anything it must be permitted to exert a controlling influence on prices. I believe this for the reason that the difference between a sales policy based on cost and a sales policy based on something else is the difference between a sure profit and a hoped-for profit. There is no doubt that the man who is given the power to say the final yes or no about selling should have (and may always have) a good working knowledge of modern cost accounting, but it is my impression that we do not seriously consider costs except in case of last resort, or when competition becomes so severe that we know it would be wrong to go further. Then, it is, that we look around for some argument to fortify our courage in saying no. In defense of this statement I submit that certain articles are today selling for less money than back in the nineties, and Mr. Bray has clearly proved that the cost of manufacture is several dollars per ton higher.

Do not gain the impression that I think costs are ignored, for they are not. All of us have spent many interesting and beneficial hours analyzing cost sheets; but when it comes to making prices, the easiest way is to make them upon what we think trade conditions are. When the demand is normal, or above, we endeavor to secure all the commodity will bring, and when conditions are reversed we force ourselves to be content with what we think competition requires. Neither is exactly right, for in each case values become to a certain extent speculative, either too high to stimulate continued consumption, or too low to encourage confidence. Both also suggest interference, for the former prevents a healthy growth of the industry and the latter is unfair to the capital invested.

RESERVES AND LEVEL PRICES

If we keep moving in the same direction as in the past, it is only a matter of time when unusual profits during any period will be questioned. If we are not permitted to anticipate a reversal in demand by creating reserves that will carry us through the famine, our better judgment will surely force the adoption of total cost plus, for a selling price. Now, then, what are we going to do about it? In our personal relations we adjust our living expenses to our incomes, and I ask if we do not owe it to ourselves and to our employers to adopt similar methods in conducting the business affairs entrusted to our care?

Mr. Bray concludes that under normal operating conditions an average profit of $3 per ton on the raw steel produced is necessary in order to guarantee 6 per cent. on the investment, with the proviso, however, that this does not include interest on the investment that has been made by most of us for the next generation. I would add that neither does it provide for irregularity of output due to the business public making up its mind periodically to cease buying. So why not base your selling prices, in good times or bad, upon mill costs, plus overhead, and then plus a reasonable rate of profit? If this plan were generally followed, I predict that actual selling prices would not, in any locality, vary more than they do now, and it would remove certain kinds of demoralization now most difficult to contend with.

To carry this a step further, in connection with our own business, we have frequently thought that it would be feasible to establish a dead line, well within the limits of safety, at a point, say, that would relieve us from the charge of dissipating our irreplaceable reserves of ore and coal. It has always been considered good accounting practice to build up a reserve sufficient to insure a proper return on the investment. But with a let-up in demand comes a terrible desire to run to cover, and this coupled with competition, as we find it, plays havoc with all such good resolutions.

My remarks may seem visionary to an extent and at variance with the fixed law of supply and demand, but each new year brings new ways and methods. We are no longer jealous of the prosperity of our competitors. There is more of a spirit of co-operation between buyer and seller than formerly existed. So why is it not fair to presume that, as we progress, a proper return on the capital invested in legitimate enterprise can be practically assured? This can only be accomplished when we arrive at the sane method of studying our costs first and making our prices afterward.

A Sane Selling Policy with Attention to Costs*

C. SNELLING ROBINSON

Second Vice-President, Youngstown Sheet & Tube Company, Youngstown, Ohio.

A careful examination of the statements made presents to us the fact that the proportion of costs due to wages has increased nearly 50 per cent. since the low periods mentioned by Mr. Bray. As labor constitutes the largest single item in the cost of any steel product—authorities placing it in some instances as high as 90 per cent. of the total—it is evident that the values of steel products have been largely effected by the liberal reward labor has received.

RETURNS TO CAPITAL

Admitting that plant cost per ton of steel produced is more now than ever before, due largely to the cost of improved and labor-saving machinery and to changes in methods and processes, and recognizing that labor itself has been generously requited—how has capital fared? The average return covering the last fifteen years has been satisfactory—excepting during a few temporary depressions—and represents a reasonable profit. The earnings, however, for the last six months or more have not only been inadequate, but reflect a condition under which only the most modern plants, carefully financed and economically managed, could continue to exist, provided due regard were given to proper maintenance and depreciation charges.

The steel companies, as a rule, are managed by men above the average in sagacity and business ability, but it would appear that through the integration of properties the responsible heads of large companies may have become less mindful of profits on the separate progressive steps of manufacture than they were formerly when a profit on pig iron, on ingots, on blooms and on sheet bars was essential. The apparent tendency is to consider only a final profit on the article sold, and as a result in times of financial stress or business strife the "investment factor" may become obscured or entirely lost sight of. As an example, when this factor is properly considered the so-termed sheet mills are at present buying bars from producers at less than cost.

SALES POLICY

Mr. Bray gives cogent reasons why the investment factor should always receive careful consideration in making sales, and makes a strong plea for a close relationship between sales policy and costs. If some steel companies do relate their sales to costs, it is obvious from certain recent prices that all do not or that at times many purposely neglect them. In other words, the old policy of meeting the market is now much in evidence; a policy liable to be based on ruthless, unrestricted competition, and as ordinarily applied, utterly disregardful of knowledge or consideration of the investment factor and at times of all costs. By it prices are simply met, many of them being phantasmal or those quoted by irresponsible or financially weak bidders; such a policy tends to inefficient effort on the part of sales managers and trade demoralization.

EXTENT OF OPERATIONS

Without doubt one of the most difficult problems confronting the heads of our large companies is the question of how to operate their plants during periods of depression such as we are now passing through. We can readily appreciate that the extent of the opera-

*Discussion, substantially in full, of paper by T. J. Bray, read before the American Iron and Steel Institute, New York, May 22.

tions will have a direct bearing on the investment factor (which is assumed to have been worked out upon full normal operations) as well as upon other items which enter into the costs. If at such times each would be content with a proper percentage of the business offered, a larger return would be made.

Finally, if success is to be attained, it must be through the most careful attention to operating costs, backed up by a sane selling policy—a policy that considers all points of cost and that appreciates the fact that the invasion of another's legitimate territory must bring retaliation and harmful results.

Labor and Other Costs in Manufacturing*

Establishing the Value of Second-Hand Apparatus—Outline of Overhead and Miscellaneous Charges—Nine Elements of Labor Cost

BY FORREST E. CARDULLO

In connection with the question of depreciation, it is often necessary to consider the second-hand value of equipment. A piece of second-hand equipment will obviously have a shorter useful life than a piece of new equipment, or else there has been no depreciation whatever. In consequence of this the rate of depreciation is much higher for second-hand equipment. The repairs upon a piece of equipment become larger year by year, so that everyone who buys second-hand equipment must expect a larger annual charge for repairs than would be the case with new equipment. In principle the second-hand price of a piece of equipment ought to be such that the annual cost of the equipment for the period of its useful life would be the same as would be the annual cost for new piece of equipment. The following problem will serve to make the principle clear.

Assume that a boiler has a useful life of 20 years, and that at the end of 10 years it is necessary to sell it as a second-hand boiler. Assume further that the interest rate is 5 per cent., that the depreciation should be computed on the basis of 4 per cent. compound interest, that insurance and taxes together are 2 per cent. of the original cost, and that the repairs amount to $15 per year for the first five years, $30 for the second, $45 for the third, and $60 per year for the fourth five years of the useful life of the boiler. Assume further that the cost of the boiler when new is $1000, and that the cost of the setting is $500. The annual charges upon the boiler and setting assuming 20 years of life, will be as follows:

Interest, $1500 at 5 per cent.	$75.00
Depreciation (for 20 years) $1500 at 3 1/3 per cent.	50.00
Insurance and taxes, $1500 at 2 per cent.	30.00
Repairs (average for 20 years)	37.50
Total annual charges	$192.50

If someone buys this boiler at the end of 10 years it will be serviceable for 10 years longer. In re-erecting the boiler in a different place, it will be necessary to spend $500 for the setting, and the total fixed charges upon the boiler and setting must not exceed $192.50 per year. The annual charges for repairs upon the old boiler will average, for the last 10 years of its life, about $52.50 per year, leaving $192.50 — $52.50 = $140 per year to cover interest at 5 per cent. depreciation (for 10 years) at 8 1/3 per cent., and insurance and taxes at 2 per cent., a total of 15 1/3 per cent. The $140 is of course 15 1/3 per cent. of $913. Consequently, the value of the boiler and setting is $913. Since the value of the setting is $500, the second-hand value of the boiler is $413.

In general, the method of discovering the second-hand value of a piece of equipment is to find the total annual fixed charges upon the equipment when new, to subtract from this the annual repairs for the remaining period of life of the equipment, and to divide the difference by the sum of the remaining fixed charges expressed as a per cent.

CONSTRUCTIVE AND ACTUAL PAYMENTS

It may be noted in connection with the costs of operation chargeable to the use of capital that the payments are of two kinds, constructive and actual. An actual payment is a payment made at a time specified and for a specified purpose. Taxes are payments of this character. A constructive payment, however, is not actually made at the specified time. It is the equivalent, at that specified time, of some actual payment made at a different time, or of some loss sustained. The amount of a constructive payment is of course determined by the principles of present worth. An example of a constructive payment is the equivalent annual payment made on account of repairs. When a constructive payment is considered in estimating costs, no attention is paid to the actual payment, since the constructive payment is its exact equivalent.

As examples of actual and constructive payments the following will serve. Interest is an actual payment when made on account of borrowed capital, and constructive when the capital is owned by the owner of the business. Depreciation is an actual payment when a sinking fund is created, a constructive payment when the returns are employed in extending the business. Insurance is an actual payment when insurance premiums are paid, and a constructive payment when the owner carries the risk.

CHARGES NOT DUE TO CAPITAL

Besides those payments, constructive or actual, made on account of the use of capital, there are three other classes of payments. They are respectively, payments for labor, payments for materials and payments for service.

Under the head of labor costs are properly included all payments made to labor, either for work performed (i. e., wages) or as a reward for unusual services (i. e., as a bonus), or in recognition of long and faithful service (as, for instance, a stock dividend to employees), or in payment for injury sustained in service. Any payment made to a servant of the company, whether he be the general manager or an apprentice boy, because of

*Fourth article on the economics of a manufacturing business, the first appearing on page 1172, issue of May 7. The author is professor of mechanical engineering, New Hampshire College, Durham, N. H.

work or service that he performs or because of his relation as an employee, is properly included under this head.

Under the head of payments for materials, we may properly include only payments made to those persons or firms who sell the material. Such payments must be made on account of materials purchased, and not to pay for the examination, testing, or transportation of the material. For instance, if a quantity of pig iron is bought, the payment made to the firm from which it was purchased is a payment for material, but the freight bill is a payment for service, as would be a bill from a consulting chemist who analyzed the iron. In like manner, a payment made to the laborers who unloaded the iron is a payment for labor.

Payments for service are of various kinds. They may be for such a thing as legal service, when that legal service is not rendered by an employee of the company; for transporations of various kinds, such as freight, passenger fare, cartage, etc., for postage, for such service as telephone and telegraph service, etc., for professional advice, for advertising, and for various other things which it is necessary to buy, and yet which do not involve the delivery of materials. There are in addition to the payments classified above a number of different kinds of payments which can only be classified under the term miscellaneous. Examples of such payments are payments made for the use of a patent, contributions to charitable and other organizations, payments made for entertainment and any other payments made or losses sustained which cannot be charged to the account of capital, labor, material or service.

OTHER CLASSIFICATION OF COSTS

While the classification of costs into costs of capital, labor, material and service and miscellaneous costs, is entirely rational, such a classification will usually fail to have any practical value. Accordingly it is better not to classify costs in accordance with the purpose for which the payments are made, but to classify them in that manner which will make the system of the greatest practical value. For example, it is a matter of great interest to know the cost of a pound of tool steel when it is delivered to the tool maker for the purpose of being made into a milling cutter. We do not care at all, however, about the fact that certain payments are made to the Blank Steel Company for tool steel, certain others to the A. B. & C. railroad for freight, still others to John Doe, the stock clerk, and so on through a long list of costs incurred on account of labor performed, material used, service rendered, or capital employed, in purchasing, storing, testing and delivering the given piece of steel, together with a thousand other things in which we are not at the moment interested.

There are two reasons why we may wish to classify costs. The first one is in order to determine the cost of doing a given piece of work or performing a given operation. The second one is to determine the cost incurred by the use of a given material, machine or person. Such information will of course be of value in a number of ways. We may wish to compare methods in order to see which is preferable. We may wish to discover whether a certain machine or employee is profitable or not. We may wish to determine whether it pays to manufacture a certain line of product. We may wish to find out what constitutes a fair price, or we may want to discover some unexpected source of loss. The system of cost classification which we adopt must be one which will lend itself readily to such purposes. In order to facilitate the development of a simple and easily understood system, and to reduce the labor of its application, certain conventions of bookkeeping are often employed. An example of such a convention has already been given in the case of constructive payments.

RENT

Another convention which is of great use in cost accounting is known as rent. Let us suppose that a certain piece of work is made in a large and costly automatic machine. This machine must be housed within a suitable building, which in turn is erected upon land of some value. This machine divides the use of this building and land with a number of other machines. Accordingly it is convenient to compute the fixed charges upon the building and the land, and to distribute the sum of these charges among the different machines in proportion to the floor space which they occupy in the building. If there are 50 similar machines in the building, and the fixed and other charges upon the land and building are $5000 per year, each machine would be charged with $100 per year as its share of the annual cost of the building. Such a charge against the machines is known as rent. In like manner the machine uses a certain portion of the output of the power plant. If it uses 2 per cent. of the power it must be charged with 2 per cent. of the cost of operating the power plant. The machine requires the use of a certain amount of oil, waste, etc. There are certain fixed charges due to the known cost of the machine. Adding all of these items together, we obtain an item usually called to rent of the machine, and which is really the cost of operating the machine.

If the annual cost of operation be divided by the number of working hours per year, we will have the hourly rent of the machine. Sometimes the rent is reckoned by the hour, sometimes by the day, week or month. Any job performed in the machine is charged with the rent of the machine for the time during which it occupies the machine. In like manner each building may be charged with the rent of the ground which it occupies, each machine may be charged with a proportion of the rent of the building which it occupies, each workman not employed on a machine may be charged with a certain building rent, etc. By the use of this convention, costs may be transferred and summed up, so as to facilitate them against the proper piece of equipment, the proper operation, the proper piece of material, or the proper employee.

OVERHEAD EXPENSE

A second convention very frequently employed by the accountant who is unable to analyze the complexities of cost distribution is termed overhead expense. This is an item charged against everything manufactured by the company, and is supposed to include all those items which cannot be directly charged to some particular piece of work. It includes such things as the salaries of the executives, office expense, wages of foremen, cost of power, cost of materials which do not form part of the finished product, janitor service, repairs to plant, fixed charges on the plant, and various other items of this nature. In many plants the books are so kept that the items charged to overhead expense are often as much as a third of the total expenditures. While it is of course impossible to treat every item of expense in such a way

that it may be levied against the proper part of the output, it is nevertheless possible to so treat the great majority of expenditures that they will eventually be charged against that portion of the output on account of which they were incurred.

There are two objections to lumping either large numbers of items or large items, under such a classification, and charging them against the whole product. The first is that such a procedure does not make it possible to determine correctly the cost of different operations, or of different parts of the product. The second is that it leads the management to regard the item of overhead expenses as a sort of "economy mine." The tendency of this is to foster changes in method which tend to reduce the sum total of the "overhead charges," irrespective of the effect of such changes upon the efficiency of the plant.

ELEMENTS OF THE COST OF LABOR

The labor cost of a piece of work is not measured entirely by the number of hours of labor expended, multiplied by the wages paid per hour. In addition to the wages (or piece price) paid to the workmen, there are a large number of other elements of cost which must be considered as part of the cost of labor. These elements cannot be so exactly classified as the elements of the cost of capital, but there are certain ones which are obvious, and account must be taken of them in any cost system.

The elements of the cost of labor are: first, wages; second, premiums or bonuses; third, the cost of supervision; fourth, the cost of wage payment; fifth, the cost of hiring labor; sixth, the cost of training labor; seventh, the cost of comforts; eighth, the cost of injuries; ninth, gifts.

The first element, that of wages, is readily understood. When a concern is employing the piecework plan, the payments made on account of the piece rate may be considered under this head. The second element, premiums or bonuses, may also include payments made on account of piece work, and it is sometimes impossible and often unnecessary to make any separation of these elements. Taken together, they constitute the only labor costs recognized by many systems of cost accounting.

The cost of supervision will vary according to the nature of the work and the thoroughness with which the system of supervision is organized. It includes all of the labor costs due to bosses, foremen, superintendents, etc. It should be distributed among the different workmen in proportion to the amount of supervision which their work or their ability makes necessary. Apprentice boys naturally require more supervision than expert workmen. Men employed on jobs which require a long time to perform require less supervision than men continually changing from one job to another. This cost of supervision includes not only the wages of the foreman, etc., but also the cost of supervising them, of paying them, training them, etc., together with their office expenses when they have an office, as they very often do.

In order to keep track of the time which men spend at work and the wages due them, it is necessary to employ a paymaster and sometimes several assistants. The entire cost of conducting the paymaster's office must be distributed among the employees as part of the labor costs.

Many firms attempt to train their employees in order to increase their efficiency, and the cost of this training is a part of the cost of labor. Costs incurred on this account should be distributed among the different classes of employees in proportion to the cost of training these different classes. The expenses of hiring labor may be so small as to be negligible, and may be included in the cost of supervision or the cost of training. With many firms the cost of training is included in the cost of supervision, since no especial provision is made for training the employees.

The cost of comforts includes the cost of maintaining toilets, wash rooms, lockers and other conveniences for the workmen. In many places it includes losses incurred from the operation of the workmen's dining room and other forms of welfare work. This cost may be distributed equally among all workmen.

With the advent of employers' liability and workmen's compensation laws, one of the costs of labor is the cost incurred on account of injuries to workmen. Such costs are properly distributed among the different classes of workmen in proportion to the risk of injury.

Finally we have among the costs of labor gifts made to workmen for any cause whatever, and these may include gifts made to other parties because of workmen. Probably the largest gifts on record of this kind is Henry Ford's gift to his employees of a sum equal to one year's wages which was distributed at the end of 1913. The costs of gifts may be distributed equally among the workmen, or in proportion to their wages.

It may be seen from the outline given above that the hourly labor cost for any workman includes not only the wages paid to that workman, but also a number of other costs which may range according to the nature of the organization of the plant, between 5 and 50 per cent. of the wages. When this labor cost has been determined for any class of men, it may be charged as part of the labor cost of every job that any man of that class does.

The L. S. Starrett Co., Athol, Mass., has placed on the market various styles of tool chests for mechanics who desire to have a place in which to keep and carry their tools. The chests are arranged with drawers and a till, all of which are lined with felt to prevent the tools from being marred. The chests come in two lengths, 17 and 20 5/16 in. and two hights, 10¾ and 12⅜ in., the width of all three being the same, 7⅝ in.

About 3500 tons of new structural steel intended for the proposed Arlington Hotel, Washington, D. C., which had been delivered but not erected, has been bought by the Joseph Joseph & Brothers Company, New York, at receivers' sale. The sale has been approved by the court. The price paid was not far above the value of the material as scrap.

The Chicago & Northwestern Railroad has ordered 40 locomotives, 15 Pacific and 25 mikado type, from the American Locomotive Company and the New Orleans & Northeastern 3 mikado and 5 Pacific type from the Baldwin Locomotive Works. The Pennsylvania Railroad denies that it is to build 84 mikado type locomotives at its own shops.

The Chicago agency of the Industrial Works, Bay City, Mich., which has been with Mudge & Co., has been discontinued. For the present the Chicago territory will be handled from the main office in Bay City, but in the near future a sales office will be opened in Chicago under the name of the Industrial Works.

The idle car statement of May 15 shows a net surplus of 238,642 freight cars on the lines in the United States and Canada, an increase of 9763 cars in the first half of May. The low point this year was on March 15, when there were 124,865 idle cars. On May 15, 1913, the number of idle cars was 50,294.

WESTINGHOUSE ELECTRIC

Record Sales in Year Ended March 31, 1914 — Liabilities Reduced Over $5,000,000

The report of the Westinghouse Electric & Mfg. Company for the fiscal year ended March 31, 1914, shows gross sales of $43,733,646, which was an increase of $3,756,081 over the preceding year and the largest in the history of the company. With a liberal amount written off for depreciation, $310,608 was added to the surplus, which stood at $7,659,130 at the close of the year. The income account compares with the previous year as follows:

	1913-4	1912-3
Gross sales	$43,733,646	$39,977,565
Costs*	39,016,423	35,406,293
Manufacturing profit	4,717,222	4,571,272
Other income	1,280,856	996,564
Total income, all sources	5,998,078	5,567,836
Interest	1,706,005	1,612,415
Adjustments, debit†	233,264	791,388
Balance	4,058,809	3,164,032
Preferred dividends	279,909	279,909
Common dividends	1,405,989	1,053,666
Balance	2,372,911	1,830,457
Adjustments credit	594,974	119,207
Previous surplus	7,348,522	6,648,964
Total surplus	10,316,407	8,598,628
Depreciation of inventory	2,286,590	966,919
Miscellaneous deductions	370,687	283,187
Profit and loss surplus	$7,659,130	$7,348,522

*Factory cost, including betterments and extensions, also selling, administration, general and development expenses.

†Inactive apparatus and material scrapped, bad accounts and extraordinary items of expense charged to income.

The consolidated balance sheet of the company and its subsidiaries in the United States as of March 31, 1914, compares as follows:

Assets

	1913-4	1912-3
Property and plant	$20,054,595	$20,467,225
Sinking fund	455	160
Securities in other companies	22,104,482	23,882,860
Cash	6,210,782	5,259,335
Cash for coupons, etc.	132,951	105,106
Notes receivable	4,289,637	3,796,941
Accounts receivable	8,110,202	8,920,820
Due from stock subscriptions	38,883	44,788
Deferred charges	890,833	813,333
Raw material, work in progress, etc.	14,663,387	18,510,222
Patents, franchises, etc.	6,176,031	6,198,195
Total	$82,672,240	$87,998,988

Liabilities

Preferred stock	$3,998,700	$3,998,700
Common stock	36,700,288	36,700,288
Funded debt	22,096,000	22,652,000
Collateral notes	7,220,000	10,220,000
Long term notes	524,250	959,250
Real estate mortgages	413,000	483,000
Notes payable	.....	300,000
Dividends payable	421,569	421,446
Unpaid interest	132,951	99,607
Accounts payable	2,210,391	3,361,359
Taxes, etc., accrued	546,280	559,752
Miscellaneous	.....	60,850
Reserves	749,741	834,214
Profit and loss surplus	7,659,130	7,348,522
Total	$82,672,240	$87,998,988

Chairman Guy E. Tripp, in his accompanying remarks to stockholders, gave much interesting and encouraging information. Among other things he said:

The decrease of $402,242 in the item of "property and plant" is due to the fact that the charges for depreciation of buildings and equipment exceeded the amounts charged to capital account for additions to plant.

With the sinking fund payment made during the year there was retired and canceled a total of $556,000, face value, of convertible bonds, making a total now retired and canceled through sinking fund payments of $3,754,000 of the authorized issue of $25,000,000.

During the year the balance of $1,540,000 of a total of $3,500,000 debenture certificates issued by the company in 1898, was retired.

The five-year notes aggregating $429,500, issued to creditors under the plan for the discharge of the receivers in 1908, matured January 1, 1914, and were paid.

The collateral notes aggregating $3,500,000, placed during the previous year and to which reference was made in the report for that year, were paid in full during the current year. An additional collateral loan of $1,250,000 was placed during the year and will be paid at maturity on June 29, 1914.

The issue of three-year 6 per cent. collateral notes due August 1, 1913, were renewed to the extent of $3,250,000 for two years. All of the bonds and the majority of the capital stock of the Scranton & Wilkes-Barre Traction Corporation pledged under these notes have been sold. With the funds already available from this sale part of these notes have been retired since April 1, and it is the intention to call any balance outstanding on August 1, 1914.

The payment of the above-mentioned notes aggregating $4,500,000 will be made from the proceeds of sales of securities, and therefore will not deplete the working cash capital of the company; and further their payment will return to the treasury a large amount of surplus securities pledged thereunder and will leave outstanding but one issue of collateral notes, namely, the ten-year 5 per cent. notes due October 1, 1917, amounting to $2,720,000.

The total liabilities of the company show a decrease of over $5,000,000 as compared with the previous year.

The liquidation of the Russian company has proceeded most satisfactorily. The latest advices from the liquidator indicate that in addition to the balance due the parent company for cash advances, there will be realized an amount sufficient to pay the greater part of the present book value of its investment in the debentures of the Russian company. It is expected that the liquidation will be completed during the current fiscal year.

The report of the British Westinghouse Electric & Mfg. Company, Ltd., for the year ended December 31, 1913, reflects a continued improvement in the affairs of that company. At the annual meeting of the shareholders on April 6, 1914, a dividend (the first since 1904) of 5 per cent. on its preference shares was declared out of the results of the operations for 1913, which rate it is expected will be maintained, the company having now accumulated an ample cash working capital.

The affairs of the French company again show improvement during 1913. Its net income exceeded that of any previous year in its history.

The Italian company has received additional orders for locomotives from the Italian Government beyond those referred to in last year's report and now has orders in hand sufficient to fully occupy its facilities during the current year.

The value of unfilled orders on March 31, 1913, was $12,061,473; on March 31, 1914, the value of unfilled orders was $7,951,385. The average number of employees during the year was 18,635 as compared with an average of 20,542 for the previous year.

New England Foundrymen's Association

The New England Foundrymen's Association held its spring meeting at Hotel Bond, Hartford, Conn., May 13. The afternoon was to have been devoted to an automobile ride, but the condition of the weather necessitated a change of plans, so that most of the visiting members were shown through the Underwood Typewriter Company's plant and some of the local industries. The dinner was served at 6 o'clock and this was followed by a short business meeting. The speaker of the evening was H. M. Lane, Detroit, and his subject was "The Reclaiming of Waste Foundry Sand." The lecture was illustrated with lantern slides showing some of the equipment which was put in the experimental plant at Detroit for solving these problems.

An order has been issued by the Pennsylvania Public Service Commission requiring all trolley cars operated on surface lines to be equipped with jacks by June 1, 1915, one-half of the cars to be equipped by December 1, 1914. The jacks are to be capable of lifting one-fourth of the weight of a double-truck car and one-half of the weight of a single-truck car.

PERSONAL

E. T. Stuart has resigned as treasurer and assistant secretary of the Cambria Steel Company and has been succeeded by Vice-President Alex. P. Robinson. Philip B. Burtis has been elected assistant secretary. E. N. Smith has resigned as treasurer of the Pennsylvania Steel Company and has been succeeded by Mr. Stuart. Edward T. Stotesbury has resigned from the board of directors of the Cambria Steel Company and E. E. Slick, vice-president and general manager, has been put in his place. Mr. Stotesbury recently withdrew from the executive committee of the Pennsylvania Steel Company.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., announces changes in sales departments as follows: F. N. Kollock, Jr., has resigned his position as district manager of the Seattle office to accept the position of treasurer and assistant secretary of the Westinghouse Lamp Company, Bloomfield, N. J. W. D. McDonald, formerly branch manager of the Minneapolis office, has been appointed to succeed Mr. Kollock as district manager at Seattle. C. C. Curry has been appointed acting branch manager at Minneapolis to succeed Mr. McDonald.

Robert Garland, of the Garland interests, Pittsburgh, has been elected first vice-president of the Chamber of Commerce in that city.

F. F. Prentiss, vice-president of the Cleveland Twist Drill Company, Cleveland Ohio, sails May 28 for a motoring trip through European countries. On May 22 he was tendered a dinner at the Union Club in Cleveland by 46 of his friends and business associates, the dinner being given as a tribute to his civic and charitable activities.

A. Lindskog, sales manager, and B. O. Ekman, assistant general manager of the S K F Ball Bearing Company, Gothenburg, Sweden, are in this country for a stay of several weeks, making their headquarters with the New York office of the company at 50 Church street. They will sail for home about June 10.

James Potter, Potter & Johnston Machine Company, Pawtucket, R. I., sailed May 20 for a European trip.

Henry Prentiss, Prentiss Tool & Supply Company, New York, sailed May 26 on the Vaterland for a stay of three or four months abroad. He will motor through a large part of England and also visit the Continent.

Ernest Humbert, Niagara Falls, N. Y., sailed May 20 for France, expecting to return to this country about June 27.

T. N. C. Nevill, of the St. Helens Smelting Company, antimony refiner, Manchester, England, sailed from New York on the Mauretania this week after a seven weeks business trip in the United States and Canada.

T. F. Pimper, formerly with the New York office of the Niles-Bement-Pond Company, is now associated with Harron, Rickard & McCone, San Francisco agents for the Niles lines.

J. D. Fidler, formerly secretary of the Acme Cement Plaster Company, has been since January 1, 1914, associated with the Walter A. Zelnicker Supply Company, St. Louis, as traffic and office manager. His railroad experience dates back to 1889, when he entered the Dayton & Union Railroad service at Arcanum, Ohio. G. H. Dirhold, for 12 years advertising service manager for the Simmons Hardware Company and formerly editor of Hardware, New York, has accepted the position of advertising and publicity manager for the Walter A. Zelnicker Supply Company.

B. J. Padshah, Bombay, India, managing director of the Tata Iron & Steel Company, Sakchi, Bengal, arrives in this country this week to canvass the situation with a view to shipping rails and pig iron from the Tata plant to the United States. He will also visit Canada on the same errand.

Pittsburgh and Nearby Districts

The Bessemer steel plant of the Republic Iron & Steel Company, Youngstown, Ohio, which was idle for three weeks from lack of orders, resumed operations on Sunday night, May 24, with a fair amount of business ahead. This week all departments of the company at Youngstown are in operation except the 20-in. bar mill at the Brown-Bonnell works.

W. H. Hepburn, receiver of the Leetonia Steel Company, has filed a petition at Lisbon, Ohio, asking for authority to sell the company's property at auction. Liens on the property amount to $777,076.55, including bonds secured by mortgages held by the Commonwealth Trust Company, of Pittsburgh, mechanics' liens and unpaid taxes. Unsecured liabilities have been filed to the amount of $220,910.30. The petition will be heard June 8.

The use of natural gas for manufacturing purposes in the Mahoning and Shenango valleys is increasing, due to the larger supply and its low cost. The Youngstown Sheet & Tube Company is using natural gas in its heating furnaces, rod mill, wire galvanizing plant, two tube mills and bending furnaces, No. 1 skelp mill, sheet galvanizing department, laboratory, the metal mixer conduit baking ovens, and Bessemer and open-hearth ladle dryers. The Brier Hill Steel Company is using natural gas in six of its seven open-hearth furnaces, and expects to be able to furnish definite figures as to results within a short time.

It is stated that about 6500 tons of steel will be used in the new William Penn Hotel, Pittsburgh, and it is intended to make it one of the finest hotels west of New York. It will be under the same management as the Fort Pitt Hotel in Pittsburgh.

The new bar mills of the Franklin Steel Works, Franklin, Pa., replacing those destroyed by fire May 5, 1913, are nearly completed and the company expects to start its 9-in. mill about June 20 and its combination 18 and 12-in. mills about July 1. The construction work of these new mills has been done entirely by S. Diescher & Sons, consulting engineers, Farmers Bank Building, Pittsburgh. The products of the works will be steel bars for concrete reinforcing, in plain rounds, plain squares, flats and square twisted.

The Kidd Drawn Steel Company, Aliquippa, Pa., has been granted a charter with a capital of $50,000. The new company has purchased the plant of the Kidd Brothers & Burgher Steel & Wire Company, is now making repairs and improvements and expects to put it in operation shortly. The products will be drilled rods and other specialties.

The Youngstown Iron & Steel Company, Youngstown, Ohio, has not yet selected a site for its new open-hearth steel plant. It is possible that the plant will be located near Mary furnace of the Ohio Iron & Steel Company.

On May 13 No. 3 Duquesne and No. 5 Ohio and on May 16 No. 3 South Sharon furnace of the Carnegie Steel Company went out of blast. At present the company is operating 31 blast furnaces and has 28 idle.

The Aberthaw Construction Company, Boston, Mass., is erecting new buildings at New Haven, Conn., for the Oven Equipment & Mfg. Company and the Highwood Company. The plans provide for a large main building more than 400 ft. in length, with several buildings at right angles to this and separated from each other and from the present Oven Equipment Company buildings by generous courts. The Construction Company is erecting the buildings on a cost-plus-profit basis and a large portion of it, including the form work for concrete, is being carried on under a bonus system which is working out to good advantage for all parties in interest.

Rudolph Kauert, Kauert & Doehler, Toronto and Montreal, dealers in machinery and tools, sailed May 19 for Europe.

OBITUARY

John R. Scott

John R. Scott, manager of sales in the Cleveland district for the Carnegie Steel Company, the Illinois Steel Company and the Tennessee Coal, Iron & Railroad Company, died at his home in Cleveland, May 20, aged 49 years. He had been in failing health for about two years and for several months had been able to give only a little attention to business. Last October he went to Europe, hoping that the trip would prove beneficial,

JOHN R. SCOTT

and remained abroad for a few months. He was one of the best known steel salesmen in the country and also one of the most popular. He was born in St. Louis and secured his early training as a steel salesman in that city, representing various mills. About the time the Steel Corporation was organized he became connected with the St. Louis office of the Carnegie Steel Company, the Illinois Steel Company and the American Steel Hoop Company. In 1902 he opened an office in New Orleans for the Carnegie and the Illinois Steel companies and the American Sheet & Tin Plate Company and at the same time managed the Atlanta office of the two first named companies. In 1905 he was given charge of the Cleveland office of the Carnegie Steel Company and the Illinois Steel Company. He was one of the organizers and president of the Marathon Tire & Rubber Company, Cuyahoga Falls, Ohio, a director of the Central National Bank, Cleveland, and a member of the Cleveland Chamber of Commerce, and of the American Iron and Steel Institute. Besides Mrs. Scott, he leaves two daughters, Mrs. George L. Comey and Miss E. Beryl Scott.

NELSON D. PRATT, long promient in the Chicago wire trade, died at his home in Evanston, Ill., May 22, from a stroke of apoplexy four weeks before, aged 70 years. He was born in Southbridge, Mass. His first business experience was as a telegraph operator for the press in New York City during the Civil War. He went to Chicago in 1869, becoming connected with Cragin Brothers, hardware jobbers. The great fire of 1871 destroyed their store and he removed to Cleveland, Ohio, where he secured a position with George Worthington & Co. He returned to Chicago in 1879 to establish the Western office of the Cleveland Rolling Mill Company, which company he continued to represent until it was absorbed by the American Steel & Wire Company. Since that time he has been associated with the Grand Crossing Tack Company and the Spencer Wire Company. He leaves a widow, one son and one daughter. His son, William E., manages the business of the William E. Pratt Mfg. Company, making malleable iron castings at Joliet, Ill.

PETER D. WANNER, prominently identified with the iron business from 1885 to about 1901, ended his life by shooting himself May 21 in his home at Reading, Pa. He was 73 years of age, was born near Reading, was brought up on a farm, graduated from Franklin and Marshall College, Lancaster, Pa., and entered upon the practice of law at Reading in 1865. He was elected district attorney of the county in 1871. In 1879 he became interested in the Mellert Foundry & Machine Company, Ltd., and later in the Reading Foundry Company, eventually acquiring the sole ownership of both. In the long depression following 1893, he met with reverses and returned to the practice of law. While engaged in the manufacture of cast-iron pipe, he became interested in the construction and management of a number of waterworks and at the time of his death he was interested in several companies in this line. He leaves a widow, two daughters and three sons.

L. D. DOTY, for 19 years general purchasing agent of the Illinois Steel Company, and prior to that auditor at the Union Works and North Works from a time beginning October, 1886, died May 24, aged 68 years. He retired from active work in May, 1910, and for the last several months has been practically helpless, dying of senile paralysis. Mr. Doty was that type of purchasing official who made it a point to see all who called upon him. He took a special interest in the gathering of ore statistics.

CHARLES G. RITTER, assistant superintendent of the Lunkenheimer Company, Cincinnati, Ohio, died at his residence in that city May 23, after an illness of several months, aged 54 years. He had been with the company 22 years. In machine-tool circles he had an almost national reputation as a master tool maker. He leaves a widow and two daughters. His brother Henry is superintendent of the Lunkenheimer Company.

CHARLES HERMAN, inventor of the pneumatic jarring molding machine that bears his name, died at his residence in Zelienople, Pa., May 20, aged 70 years. He also developed many other valuable patents known in the hardware and machinery trade. He was vice-president of the Herman Pneumatic Machine Company, Zelienople. He was born in Germany. He leaves a widow and one son.

J. HOWARD EWALD, representative for 15 years of the Pittsburgh Forge & Iron Company, died at his home in St. Louis, Mo., May 19, from pneumonia, aged 49 years. He leaves a widow and two sons. He was a brother of the late L. P. Ewald, Louisville, Ky.

FRANCIS J. PECK, president of Francis J. Peck & Co., chemists, Cleveland, Ohio, died May 16 after a short illness of pneumonia, aged 47 years. For a number of years he had made a specialty of iron ore analyses.

DE B. R. KEIM, for several years Washington correspondent of *The Iron Age*, died May 24 in Washington, D. C., aged 73 years. He was born in Reading, Pa., and was graduated from Beloit College, Beloit, Wis.

GEORGE MILLARD, Burlington, Iowa, for many years connected with the Murray Iron Works Company, and secretary of the Citizens Water Company, died May 4, aged 45 years. He leaves a widow.

REUBEN H. FISHBURNE, a director of the Virginia Bridge & Iron Company, Roanoke, Va., died April 26.

Directors of the La Belle Iron Works, Steubenville, Ohio, met on Tuesday, May 26, and declared the regular quarterly dividend of 2 per cent. on the preferred stock, payable June 30, but dividend action on the common was deferred. This company is operating one of its two blast furnaces and eight of its 11 open-hearth furnaces, while its finishing mills are running 50 to 60 per cent.

Tributes to the Late Dr. Heroult

Metallurgical and Chemical Engineering, Dr. E. F. Roeber, editor, prints in its June issue a sketch of the career of Dr. Paul L. T. Héroult, whose demise on May 9 was noted in these columns May 14 and an account of his life and achievements was then given. Referring editorially to him, Dr. Roeber says:

"Héroult could have become a great mechanical engineer, but destiny made him a pioneer of electrochemistry. People wonder why Héroult and Hall should have found the same process of reducing aluminium simultaneously and independently in France and America. They might just as well wonder why it rains simultaneously in two places, if the air is oversaturated with water vapor in both. Humanity was ripe for the birth of industrial electrochemistry and the intellectual atmosphere was oversaturated with the ideas of its possibilities. Destiny's problem was to find the men who would be the nuclei of condensation. Héroult was one of them and in the history of mankind he will live forever as the pioneer of the electrometallurgy of aluminium and steel."

At a joint meeting May 22 of the New York sections of the American Electrochemical Society, the American Chemical Society and the Society of Chemical Industry, Dr. C. A. Doremus, in offering a resolution in honor of Dr. Héroult's memory spoke in part as follows:

"The visions of linking the two great oceans across the Isthmus have only been realized after centuries, but in the span of a quarter of a century Héroult brought to successful practice two epoch-making discoveries. Nor did he rest content with these. He showed us how to release aluminium from the bondage in which it had been held for geologic eons; he utilized it in the arts; he gave it to us for the treatment of steel and then carrying forward his intelligent use of the electric current not for electrolysis this time but for thermic results has founded a new art in the purification and treatment of the metal for which his age is named.

"Héroult was original, imbued with the ardor characteristic of youth, he was intrepid, resourceful, persistent, and reduced his inventions to practice, in ways that brought him international recognition."

Industrial Railroads Are Common Carriers

The United States Supreme Court handed down a decision May 25 that tap lines are common carriers, and because of their character entitled to enjoy divisions of joint through rates. The decision is far reaching, not only providing for a division of revenues which trunk lines have retained during the pendency of the tap line investigation, but by analogy compelling the Interstate Commerce Commission to retrace the steps it recently took in breaking up the division of joint rates between industrial lines and connecting through lines of road.

The decision was made in the case of the Louisiana & Pacific Railway Company and others. The Commerce Court, now abolished, had held that the Interstate Commerce Commission had erred in condemning the tap lines as mere evasions of law and institutions to obtain rebates and discriminations and that the tap lines were common carriers entitled to the privileges and bearing the responsibilities of carriers of that character. The decision of the Supreme Court is an affirmance of the decision of the Commerce Court.

While the Supreme Court holds that the tap lines are common carriers the decision points to the fact that the division of rates is under the control of the Interstate Commerce Commission and that it is its duty to supervise the division in such manner that unlawful favoritism and discrimination shall not exist. However, the commission must, it appears, proceed under the interstate commerce act and prove to the satisfaction of a court that the divisions of which it may disapprove constitute in fact rebates and discriminations.

A reinforced concrete bar, which, it is understood, is sold at the straight steel bar price without extras, is being rolled by the Cambria Steel Company. It is known as the Slick bar and is deformed on two surfaces only and these are on opposite sides.

The National McKinley Birthplace Memorial

A memorial building to perpetuate the memory of the late President William McKinley at his birthplace, Niles, Ohio, is to be erected at a cost of $200,000, according to a recent decision of the National McKinley Birthplace Memorial Association. A suitable prize is to be offered through a committee of the American Institute of Architects for the best competitive plans and drawings for the memorial. The city of Niles has given about five acres of ground as a site for the building. Cash amounting to nearly the original cost has been obtained and an additional $50,000 as a permanent endowment will be raised by a general popular subscription of small amounts.

While the design and style of the memorial will be left open to competition, subject to the approval of the Institute of Architects and the trustees, it has been decided to make the building as useful as it will be ornamental, combining the practical with the artistic. The main features will include an auditorium seating 1000, a public library, a relic room to contain personal and historic objects connected with the life of McKinley, an assembly hall for meetings of the veterans of the Grand Army and of the Spanish-American war and a room for the meetings of officials of the city. The building will be of granite, two stories and a basement. Facing the main entrance of the memorial will be a life figure of President McKinley. Bronze busts of men associated with him in the affairs of the nation are to have a place in the building. These men will be ex-Presidents Roosevelt and Taft; James Ward the elder, who was a pioneer manufacturer at Niles and established the first rolling mill there in 1842, and a bust of Senator Mark Hanna.

Joseph G. Butler, Jr., president of the Memorial Association, who is vice-president of the Brier Hill Steel Company, Youngstown, Ohio, states that the trustees had opposed all suggestions for contribution of public funds toward the project, preferring that it be erected as a popular testimonial to the martyr-President. He added:

"Since the Memorial Association was authorized by Congress at the close of President Roosevelt's term, and in the first bill signed by President Taft at the beginning of his term, we have carried on the work of collecting funds without a general public appeal. For the purpose of raising the endowment we have decided to appeal to the public generally to contribute. For a contribution of $1 or more the giver will be made a life member. In addition, each contributor will receive a handsomely bound book, giving a brief but comprehensive sketch of the life of McKinley, with his portrait, which Supreme Court Justice McKenna characterized as the best portrait of the dead President extant. When completed the building and its approaches will be one of the finest national memorials in the country."

The trustees, who may appoint their successors, making it a perpetual body, are, besides Mr. Butler, John G. Milburn, in whose home at Buffalo President McKinley died, and who is vice-president; W. A. Thomas, president Brier Hill Steel Company, Youngstown, Ohio, secretary; J. G. Schmidlapp, Cincinnati, and the American Ambassador at Paris, Myron T. Herrick.

At the meeting of the American Iron and Steel Institute at the Waldorf-Astoria, New York, last week, tentative plans and drawings of the proposed memorial, which the trustees had prepared, were exhibited to the members. Judge E. H. Gary called the attention of the members to the memorial and requested them to aid in its successful completion. Fifty per cent of the subscribers to the memorial are members of the Institute.

A large lot of new cast-iron pipe, comprising some 3500 tons, has been bought from the Pennsylvania Railroad Company by the Joseph Joseph & Brothers Company, New York. This pipe is near Dauphin, Pa., where it had been accumulated for the purpose of laying a water line which the railroad company was prevented from building by difficulties concerning the right of way. It was bought at a very low price.

The Machinery Markets

Business is dull and bright spots are difficult to find in most of the machinery markets, the central West apparently not being as cheerful as the East, although the latter territory has no more reason to be sanguine than the West. Current business in New York is light, but much dependence is placed on what will happen when the railroad rate decision comes out. In New England business is not good, but a better sentiment prevails, despite the dullness. Cleveland expects no improvement until the railroads start to buy; in that city it is reported that the automobile manufacturers are laying off men and the foundries are dull. In Cincinnati labor troubles are holding up factory extensions; only small sales are being made and the jobbing foundries have experienced no improvement. The week in Detroit has been spotty, foundries are working about 50 per cent. of capacity and no betterment is in sight. The trade in Milwaukee is just about holding its own. In St. Louis the present market is about the slowest in the history of the trade. In the central South some good sales have been reported, but business generally is quiet and made more so by labor troubles. For oil mill, ice making and other special machinery the demand is fairly steady in the Birmingham territory. In San Francisco trade is quiet, though there has been a good movement in harvesting and highway-making equipment. Mills in Washington and Oregon are shutting down because of poor market conditions, but public improvements are creating considerable business in that section.

New York

NEW YORK, May 27, 1914.

The trade has received a large list of railroad shop equipment from R. W. Cameron & Co., 23 South William street, this city, a firm which does a large export business in machinery, principally with Australia. The equipment specified is intended for the Victorian Railway of Australia. Because of their restricted territory few New York sellers will send in estimates on the list, though they are pleased that the business exists. The domestic railroad demand continues to be extremely dull, although in the past few days it has been reported that the Seaboard Air Line might be in the market earlier than had been expected. This road issued a large list some months ago, but it was nullified after estimates were in and the announcement made that the ultimate expenditure would be about cut in half. Scattered sales and a few of them are all that keep local machine tool houses occupied. In some of the heavier machinery lines, cranes for instance, prices are near the cost level. Some special lines are finding a fairly good seasonable demand, among them silk and sugar making machinery. Despite the unsatisfactory conditions the trade is maintaining a hopeful attitude, largely because of the depleted condition of railroad equipment which must soon be remedied.

The Hauck Mfg. Company, 140 Livingston street, Brooklyn, N. Y., maker of oil-burning appliances, desires to get in touch with manufacturers of pumps, valves and tanks such as are used on small gasoline hand torches.

Revised plans have been completed for a power house for the Brooklyn Hospital, DeKalb avenue and Raymond street, Brooklyn, N. Y., by Lord, Hewlett & Tallant, architects, 345 Fifth avenue, New York. Griggs & Holbrook, 3 South William street, New York, are the steam and electrical engineers. W. G. Neally is the superintendent.

Charles Heidt & Sons, 98 Fairmont avenue, Jersey City, N. J., are building a two-story cooperage plant, 150 x 180 ft., to cost about $50,000. They are in the market for one 100-hp. horizontal return tubular boiler of 150-lb. working pressure, one 12-in. x 30-in. Corliss engine, one 7½-kw. direct current generator, etc. C. H. Ziegler, 75 Montgomery street, Jersey City, is the architect.

The Mead Gas Heater Company, Delawanna, N. J., has been incorporated with a capital stock of $80,000 and will take over the business and plant of the J. H. Mead Company, 116 John street, New York City. C. F. H. Johnson, 22 Lexington avenue, Passaic, N. J., is president.

Charles A. Finnegan, manager of the E. R. Thomas Motor Company, Buffalo, and the Empire Smelting Company, Depew, N. Y., and Eugene D. Hofeler, of the Theodore Hofeler Company, Buffalo, have purchased the stock and assets of the reorganized New Columbus Buggy Company, Columbus, Ohio. According to a statement issued by the purchasers it is the intention of the new owners to consolidate the E. R. Thomas Motor Company with the Columbus plant.

The William Koehl Company, Jamestown, N. Y., box maker, is building a factory, 80 x 160 ft., three stories and basement. It is in the market for a gas engine and special equipment.

R. J. Strasenburgh & Co., manufacturing chemists, Rochester, N. Y., are taking bids for a factory building, 60 x 80 ft., to be erected on Exchange street.

The Universal Construction Company, Buffalo, N. Y., has been incorporated with a capital stock of $300,000 to manufacture patented furnaces. Herbert R. Brunner, 64 Pearl street, is managing director.

The Buffalo Shirt Company, 752 Main street, Buffalo, of which Oliver Goldsmith is president, is having plans prepared for a factory building to cost $40,000.

The Brandow Printing Company, Albany, N. Y., will build a plant 50 x 80 ft.

The National Gas Machine Corporation, Rochester, N. Y., has been incorporated with a capital stock of $250,000 to manufacture gas machines, etc. M. D. Colbath, M. Todd and J. W. VanValkenburg are the incorporators.

Charles M. Allen, Inc., Fulton, N. Y., has filed articles of incorporation showing capital stock of $25,000, and will manufacture barrels, boxes and excelsior, etc. C. M. Allen, C. M. Allen, Jr., and W. H. Hamilton are the incorporators.

The Hornell Electric Company, Hornell, N. Y., is having plans prepared for additions and improvements to its plant, including a power house, 50 x 60 ft., the installation of two 1000-hp. turbo-generators already ordered and the installation of an electric crane and several smaller machines. The estimated cost of the improvements is $80,000.

McIntyre Brothers and Roudebush, Inc., Fayetteville, N. Y., have filed incorporation papers to manufacture wood pulp, etc., and will build a mill. G. B. Roudebush, Syracuse, is one of the directors. The capital stock is $75,000.

Philadelphia

PHILADELPHIA, PA., May 26, 1914.

The Hellwig Silk Dyeing Company, Wissinoming station, Philadelphia, is making additions to its dyehouse, etc., including a boiler house and pumphouse, 64 x 120 ft., brick and concrete construction. C. P. Berger, Penn Square Building, is the architect.

Jacob Behrend, 118-130 West Allen street, Philadelphia, Pa., cabinet maker, is building an addition to his machine shop. No additional equipment is contemplated.

The Grazier Coal Mining Company, Johnstown, Pa., has been incorporated with a capital stock of $200,000 by J. A. Grazier, Johnstown, Pa., and others. It is in the market for electrical equipment for three mines. J. A. Grazier is president.

The factory of the McWhorter Mfg. Company, Riv-

erton, N. J., manufacturer of farm implements, was damaged by fire May 17. The machinery was partially destroyed, and the plant will not be in operation for a month. W. A. McWhorter is manager.

The Crown Cork & Seal Company, Baltimore, Md., has planned for an addition to its factory, 170 x 220 ft., three stories, reinforced concrete construction. The plans include an indirect blower system to be operated by the present power plant, individual and group motor drive and monorail transportation facilities.

Dietrich Brothers, Pleasant and Davis streets, Baltimore, Md., are erecting a shop, 30 x 300 ft., and are installing a craneway, 70 x 300 ft. Additional improvements are contemplated. They have already purchased several acres along the Baltimore & Ohio Railroad, where it is intended to erect structural iron and steel works, the plans for which include three buildings, each 70 x 300 ft.

Chicago

CHICAGO, ILL., May 25, 1914.

The McFell Signal Company, manufacturer of electrical appliances, has purchased property at the northeast corner of South Halsted and West Twenty-ninth streets, as the site of a two-story factory building with foundations of sufficient strength to carry two additional floors.

The C. Reiss Coal Company plans to erect an electric power generating plant in Waukegan, Ill., to supply light and power for its big coal dock.

A. S. Held & Sons, owners of the Stover Steel Tank Company, have awarded contract for two additions to their factory in Freeport, Ill., to cost $7000. The extra space is required for testing, paint and store rooms.

The Chicago & Northwestern Railway Company has authorized the expenditure of $100,000 for a general freight car repair yard at Clinton, Iowa.

The Wisconsin Steel Company has made an appropriation of $50,000 for the erection of machine shops at Nashwauk, Minn., the location of its Hawkins mine.

The Elkhart Manufacturers' Association contemplates building a $50,000 electric power plant at Goshen, Ind., for the purpose of generating power for plants owned by association members.

J. E. Erickson has had plans made for a one-story garage 66 x 186 ft., to be erected at Milwaukee avenue and Caton street, Chicago. It will cost $10,000.

The North Chicago Hardware Foundry, North Chicago, Ill., is putting up a new building for white enamel work. It is to be built entirely of steel, 40 x 60 ft., and will be modern in every respect.

The Carburetor Mfg. Company, Livingston, Ill., has about finished its factory building, has a number of machines in place and is now ready for business. The equipment includes lathes, grinding machines, automatic screw machine, drilling machines, tool makers' forge, etc.

The Alver Tower Company, Chicago, has incorporated with a capital stock of $50,000 to manufacture advertising devices and other machinery. Incorporators are F. Grossman, Nathan A. Stern, 7 South Dearborn street, and J. R. Bernstein.

The Universal Steel Product Company, Chicago, has been incorporated by Wilmer C. Bennett, 252 West Sixty-fifth street; Norman J. Tieman and Joseph D. McCord, with a capital stock of $2500, for an engineering and sales business as manufacturers' agent and contracting.

The Finkelstein Machinery & Iron Company, Chicago, has purchased all the machinery and equipment left in the factory of the Corn Products Refining Company of Waukegan.

Work on the large new machine shops of the Chicago & Alton Railroad in Bloomington, Ill., is progressing so rapidly that it may be possible to dedicate the new structure on the Fourth of July.

The Railway Economy Device Company, Chicago, has been incorporated by F. C. Schultz, A. Roy Poffers and S. R. Robinson, with a capital stock of $10,000, to manufacture railroad equipment and supplies.

The Chicago Electric Foundry Company has been incorporated by Spencer L. Adams, 69 West Washington street; Howard F. Bishop and William A. Hartfield, with a capital stock of $5000.

The Murray Iron Works Company, Burlington, Iowa, builder of engines, etc., has purchased the property formerly occupied by the McCosh Iron & Steel Works. It includes ten acres adjoining the company's present property and a foundry in West Burlington.

The North Star Iron Works & Foundry, Owatonna, Minn., machinist and founder, has been organized by G. J. Kaplan and W. J. Felton. It will continue the business of Kaplan & Felton.

Fire in Jacob Haisch's agricultural implement plant at De Kalb, Ill., May 19, destroyed the manure-spreader factory, which will be rebuilt at once.

The Tiger Vehicle Company, Moline, Ill., has been incorporated with a capital stock of $100,000 by F. G. Allen, A. C. Barber, C. R. Stephens and others to manufacture vehicles.

The Wishart Ice Machine Company, Springfield, Ill., has been incorporated with a capital stock of $40,000 by John C. and William Wishart, T. M. Dolan and Elmer E. Hagler.

The village clerk, Freeburg, Ill., will receive bids until June 1 for water works equipment, including a motor driven pump and other machinery. The Fuller-Coult Company, St. Louis, is the engineer.

New England

BOSTON, MASS., May 26, 1914.

Pretty much everyone is a little more hopeful than he has been, although business is not good. Most industries are more or less off in current orders. Yet, in the vast variety of products of New England the exceptions as regards really dull business are rather common. The wire business is generally quiet. The machine-tool builders have genuine cause for complaint, but with a few exceptional cases conditions are not actually flat. Probably the percentage of production as compared with full capacity is between 60 and 65, and stocks are not large, either in the shops or in the warerooms and storehouses of the dealers.

The Bay State Elevator Company, Springfield, Mass., has tentative plans calling for the erection this summer of a shop to be located at East Springfield. The purpose is to use this building for manufacturing and to devote the present shop on Taylor street to repair work. The new building will be 80 x 250 ft. The company's property at East Springfield comprises 11 acres.

The Holtzer-Cabot Electric Company, Brookline, Mass., has started work on the large factory which will be located on Amory street, Roxbury, near Boylston Station. The plant will have space to provide employment for 1000 hands.

Manning, Maxwell & Moore have awarded the contract for the large additions to the Putnam Machine Company plant at Fitchburg, Mass., which have been noted. The new machine shop will be 224 x 300 ft., one and two stories; the foundry, 120 x 200 ft., one and two stories; pattern storage building, 53 x 104 ft., four stories; power house, 50 x 88 ft., and office building, 53 x 105 ft., one story.

The business of the Writerpress Company, Shelton, Conn., which has been in the hands of a receiver for some time, has been sold to a new Connecticut corporation known as the New Writerpress Company, which will continue the business. The company has an authorized capital of $25,000. The incorporators are Louis F. Dodd, Montclair, N. J., and George Rosendale and Henry W. Webber, of New York City.

The Harry O. Rogers Silver Company, Taunton, Mass., manufacturer of silverware, is preparing to make a large increase in capacity, including a considerable amount of new machinery, orders for which have been placed, the company states. Several new lines will be manufactured, especially flat ware. Little building construction will be required as available floor space already exists. A total of $50,000 will be expended.

The Providence Drapery Rod Company, Providence, R. I., proposes to erect a factory in Sutton, Mass., to cost $20,000.

BECHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

The Thompson-Norris Company, Boston, Mass., manufacturer of paper boxes, has plans for an addition to its factory at Brighton, Mass., to cost $125,000.

The United Illuminating Company will erect an addition to its power plant at New Haven, Conn., which will provide an additional boiler room and pump, blower and turbine room, as well as space for other purposes. The building will be of brick and steel, 80 x 115 ft., three stories and will cost about $80,000.

The J. Stevens Arms & Tool Company, Chicopee Falls, Mass., will increase its capital stock from $400,000 to $1,100,000. The present stock is all common. In addition to a large dividend of common stock, representing accumulative surplus, to present holders, $350,000 of 7 per cent. cumulated preferred has been sold to provide additional working capital and to take up floating indebtedness.

Work has started on the new plant which the Locke Steel Belt Company, Bridgeport, Conn., will build in the neighboring town of Stratford. The factory will be 60 x 270 ft., one story and basement.

Milwaukee

MILWAUKEE, WIS., May 25, 1914.

In this district operations are just about holding their own. As usual, machine-tool business is being maintained so well as to create slight optimism in spite of a rather disheartening feeling in other lines of the metal trades. Machinery people have hoped all along that the approach of June would see a revival, but the closing week of May does not hold out any too encouraging a prospect. The Wisconsin farm crop report for May shows considerable improvement over that of a year ago. General business is gaining, although not nearly so rapidly as was hoped for.

The Wisconsin Plumbing & Heating Supply Company, 296-298 Reed street, Milwaukee, has purchased a 102-ft. frontage on Reed street, near Walker street, on which it proposes to erect a factory for the production of brass goods and general plumbing, heating and ventilating sundries. Construction work will not begin until after August 1. Andrew Steel is president.

The board of public works, West Bend, Wis., will close bids June 2 for a centrifugal pump, a 35-hp. electric motor and automatic starter, and a small list of sundries for the municipal waterworks pumping station.

Jeremiah Donohue, C. E., Sheboygan, Wis., has been engaged by Walter J. Kohler to prepare plans and supervise the installation of a waterworks, sewage and fire protection system in the new townsite of Kohler, Wis. The investment will be $25,000. Bids will be taken by Mr. Donohue after June 10.

The C. Reiss Coal Company, Sheboygan, Wis., will rebuild its coal dock at Waukegan, Ill., and install electrical equipment throughout. An electric power generating unit will be installed.

The board of education, Oshkosh, Wis., is taking bids for furnishing a complete machine shop equipment in the new Beach Manual Training School. M. N. McIver is city superintendent.

The city of Manitowoc, Wis., is preparing to spend about $35,000 for new pumping station equipment and $45,000 for a new turbine and boilers in the municipal electric light plant. A 3,000,000-gal. pump will be purchased for the waterworks system. The work will be done some time this year but no definite date has been set. Henry Stolze, Jr., is mayor.

The Galena Iron Works Corporation, capital stock $60,000, has been organized at Platteville, Wis., by T. M. Priestly, W. V. Parkinson and Edythe Marcussen.

The Prime Steel Company, Milwaukee, has been granted a permit to build a $7500 addition to its foundry.

N. P. Peterson, Waupaca, Wis., is building a machine and blacksmith shop and is buying a small list of equipment.

The Western Brass Company, Milwaukee, has been incorporated with $25,000 capital and has taken the factory at Second and Sycamore streets. It will manufacture and deal in plumbers' brass goods, valves, etc. Jay E. Halsey is president.

The Tomahawk Veneer & Box Company, Tomahawk, Wis., which established a plant January 1, is making plans for additions to double the capacity and will purchase considerable wood-working and special machinery. Reinhard Meyer is president.

The Gehl Bros. Mfg. Company, West Bend, Wis., manufacturer of ensilage cutters, has purchased a site for a new steam power plant to be erected in June and July.

The new machine shop, garage and implement warehouse to be erected for the Deicher & Arndt Company, Two Rivers, Wis., by Walter F. Blake, Appleton, Wis., general contractor, will be of brick and steel, 54½ x 120 ft., three stories, and equipped with new machines and tools throughout.

An electric traveling crane and a considerable list of tool equipment will be required for the new machine shop and office building to be erected by the Logemann Brothers Company, Thirty-second and Burleigh streets, Milwaukee. It will be of brick and steel, 50 x 200 ft., one story, and cost $12,500. Eugene R. Liebert, architect, is taking bids until June 1.

The Merrill Iron Works, Merrill, Wis., is rushing work on the reconstruction of its plant, badly damaged by fire several weeks ago. The roof is being raised and a new cupola installed, and an addition made to the south end. Considerable new machine-tool equipment will be purchased at once.

The Common Council, Kenosha, Wis., has abandoned the idea of building a filtration plant and proposes to rebuild and enlarge the municipal waterworks system, adding another intake into Lake Michigan. The project will involve $250,000 or more and is to be started next fall. A. Baltzer is city engineer.

Detroit

DETROIT, MICH., May 25, 1914.

The business outlook is unchanged. The market the past week has been spotty and sales of tools light. Inquiries are few in number and although there is some demand for certain lines of special equipment this class of business is not of great interest to the general trade. Manufacturers are also finding business dull, with no immediate prospect for improvement. The present time is "between seasons" with the automobile manufacturers and a number of plants are laying off men and this condition of course affects allied interests considerably. Conditions in the foundry trade show little change. The majority of plants are operating at about 50 per cent. of capacity. Building circles are active.

Spier & Gehrke, architects, Detroit, are receiving figures on a four-story brick factory building to be erected at Pleasant and West Jefferson avenues for John Beyster.

The Bohland Structural Steel Company, Detroit, has been incorporated with $10,000 capital stock by Charles E. Duffy, John W. Bohland and Herbert C. Carrothers.

The Alloy Steel Spring Company, Jackson, Mich., has been incorporated with a capital stock of $100,000 to take over the spring department of the Lewis Spring & Axle Company. The incorporators are Fred J. Keiser, Caspar Harnle and A. L. Wuster. The new company will occupy a part of the Lewis Spring & Axle Company's plant for the present.

The plant of the Bransfield-Billing Action & Supply Company, Saginaw, Mich., is being enlarged by the addition of two new buildings, 60 x 120 ft. and 40 x 80 ft., respectively, both to be used as dry kilns.

The Riverside Foundry Company, Kalamazoo, Mich., has increased its capital stock from $10,000 to $50,000 to provide for the construction and equipment of a new foundry.

The Pyle Pattern Works, Muskegon, Mich., is enlarging its plant by the erection of a new building, 75 x 275 ft. The structure will be used principally for foundry purposes and will house the molding, core and cleaning rooms. Considerable new equipment will be installed.

The Saginaw Motor Car Company, Saginaw, Mich., recently incorporated with $150,000 capital stock, has acquired a site of 5½ acres improved with a factory

200 x 400 ft., and expects shortly to commence the manufacture of automobiles. James P. Bowen, A. R. Thomas and W. L. Walls are at the head of the new enterprise.

The Albion Realty Company, Albion, Mich., capitalized at $40,000, has been organized to manufacture cement caskets and other cement products. The new company has acquired a factory.

The Thornapple Gas & Electric Company, operating a gas and power plant at Hastings, Mich., will install additional equipment in the gas plant and will build a new substation and transformer house at Lake Odessa.

The Carroll Foundry, Houghton, Mich., which was destroyed by fire May 6, as previously noted, suffered a loss of between $500,000 and $600,000. Machinery requirements are not formulated and depend entirely upon plans for rebuilding, not yet completed.

The New Metals Process Company, Marquette, Mich., has been incorporated with a capital stock of $25,000 to erect the new Jones "step" furnace at Marquette. John H. Lee, Chicago, is president of the company and John T. Jones, general manager. It is stated that contracts for the machinery have been closed.

The Eagle Leather Company, Whitehall, Mich., is adding two additions to its plant, one 25 x 125 ft., to be used as a currier's room, and one 49 x 125 ft., to be used as a splitting room.

The Grand Rapids Builders Supply & Fuel Company, Grand Rapids, Mich., has been organized with $50,000 to manufacture cement blocks on the Zagelmeyer system. W. J. Breen is at the head of the company.

The H. M. Reynolds Roofing Company, Grand Rapids, Mich., manufacturer of composition roofing, is adding a small addition to its plant.

The Wilmarth Showcase Company, Grand Rapids, Mich., has broken ground for an addition to its factory.

The Zenith Lumber Company, Baraga, Mich., will increase the capacity of its sawmill by the installation of a new engine, a resaw and other equipment.

The Sturgeon Valley Lumber Company, Baraga, Mich., recently organized, will erect a large sawmill at Nelson's Siding, Mich.

Cleveland

CLEVELAND, OHIO, May 25, 1914.

A little more inquiry has come out, but the market continues very dull and not much improvement is looked for until the railroads begin to buy. During the week there were some sales in lots of three or four machines, but these were small tools. The limited amount of business that is being placed is coming mostly from small shops and is for small machines, although a local machinery house booked orders for two planing machines. There is little activity in any line in general machinery including cranes and other handling equipment. The busy season in the automobile manufacturing trade is about over and some of the plants have commenced to reduce their operations. Conditions in the foundry trade continue dull.

Bids will be received by the commissioner of purchases, Cleveland, June 3 for a turbo-generator for crib No. 5 for the waterworks department, a boiler for the Fairmount pumping station and riveted steel pipe. On June 12 bids will be taken for heating equipment for the municipal bath house on Woodland avenue.

The National Lamp Works of the General Electric Company, Cleveland, will erect a gas plant in connection with its works on East 152d street. It will be equipped with four gas producers and will furnish fuel for melting the sand and alloys used in manufacture of glass. The plant will be located in a brick and steel building, about 60 x 125 ft.

The Ohio Soda Tank Mfg. Company, Cleveland, has been incorporated with a capital stock of $5000 by P. E. Klein, Fred Preisand, M. I. Scott, and others, to manufacture soda tanks.

The Acme Fence & Iron Company, Cleveland, has been incorporated with a capital stock of $10,000 by L. C. Heimberger, F. W. Rehl, and others, to manufacture wire fencing.

The Standard Metal Store Front Company, Cleveland, is the name of a new concern that has been organized by G. W. Courell and others to manufacture metal store fronts.

The Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, has added a brass foundry, 30 x 90 ft., for casting brass valves and fittings, and for contract work. An erecting shop, 80 x 120 ft., equipped with the best available testing machinery, has also been built.

The foundry of the United States Malleable Iron Company, East Toledo, Ohio, was partially burned a few days ago, entailing a loss of $35,000.

The McNicol China Company, East Liverpool, Ohio, will shortly begin the erection of a seven kiln pottery plant in Clarkesburg, W. Va. A two-story brick building, 140 x 520 ft., will be built.

The Jackson Shear & Razor Company, Fremont, Ohio, has purchased the factory building formerly occupied by the Fremont Furnace Company and will shortly install a drop forge plant.

The Allen Motor Company, Fostoria, Ohio, is negotiating for the purchase of an adjoining site on which it plans to erect a four-story factory building. The proposed site is now occupied by the Atlas Machine Company, maker of automobile crank shafts. The latter company will build a new plant if its present one is sold.

Bids for three turbine pumps for its waterworks system will be received shortly in Youngstown, Ohio.

The St. Joe Mfg. Company, manufacturer of churns, St. Joseph, Ind., will move its plant to Findlay, Ohio, where it has acquired the plant of the Findlay Table Mfg. Company.

Cincinnati

CINCINNATI, OHIO, May 25, 1914.

The Building Construction Employers' Association and the Master Carpenters' Association are still at outs, and to further complicate the trouble a dispute has arisen between the union carpenters and union metal workers. No one is disposed to go ahead on building plans until the atmosphere in labor circles is cleared up.

Business with the machine tool manufacturers has been quite dull the past week. Only a limited number of scattered orders have been received from either the domestic or foreign trade. However, much significance is attached to a report in circulation to the effect that the railroads will issue large lists immediately on the settlement of the rate question, no matter which way it is settled. One large railroad system has been holding up a list of shop equipment over two years, and it certainly seems reasonable to believe that it will be in the hands of the purchasing department at no distant date. This situation is probably duplicated by many other railroads. Machine-tool dealers are complaining, but while there is keen competition on all business there has been no price cutting on new standard tools. Several foundries report a slightly better business, but the total melt of iron by the jobbing foundries shows no improvement.

The addition to the plant of the Cincinnati Fly Screen Company, Cincinnati, recently mentioned, will be 50 x 100 ft., four stories, and of regular mill construction. Work is not expected to be commenced until late in the summer.

The Acme Machine Tool Company, Cincinnati, has tentative plans under way for enlarging its plant later in the year. No details are yet available. Practically all of the necessary equipment will be of the company's own manufacture.

The Eagle Mfg. Company, Cincinnati, manufacturer of household and hardware specialties, has increased its capital stock from $50,000 to $100,000, but does not contemplate any immediate additions to its plant in Northside.

Power and heating equipment will be required by the Good Samaritan Hospital, Cincinnati. Walter G.

Franz, Union Trust Building, is receiving bids on boilers, engines and electric generators.

The city of Hamilton, Ohio, contemplates installing a 1000-kw. generator and two boilers in the municipal lighting plant. Joseph W. Myers is director of public service.

The Air Friction Carburetor Company, Dayton, Ohio, contemplates increasing its manufacturing facilities at an early date. Nothing has been given out as to machinery requirements.

The Rubicon Tool & Grinding Company, Dayton, Ohio, was recently formed by C. O. Shaffer and George D. Barok. A shop will be fitted up for manufacturing a machine for grinding lawn-mower blades.

It is currently reported that the Xenia Rubber Mfg. Company, Xenia, Ohio, recently incorporated with $40,000 stock, intends to erect a factory at Dayton, Ohio. The company manufactures mechanical rubber goods and expects later to make automobile tires. Roy Bickett, Xenia, is one of the principal incorporators.

B. L. Bargar, director of public safety, Columbus, Ohio, is receiving bids for a machine shop that will be used for the repair of the city's automobiles and fire trucks. An appropriation of $2500 has been allowed for extra shop equipment.

The Jeffrey Mfg. Company, Columbus, Ohio, experienced a fire loss of approximately $5000 in its chain forge May 16. Repairs are already under way, and there will be no delay in filling orders from this department.

The M. E. Murphy Company, Columbus, Ohio, has been incorporated with $25,000 capital stock, to do a general contracting and construction business. It will make a specialty of building erection.

The Peebles Paving Brick Company, Portsmouth, Ohio, has purchased the plant of the Portsmouth Granite Company, Fire Brick, Ky., and will add equipment for increasing its output.

The Central South

LOUISVILLE, KY., May 26, 1914.

Business continues generally quiet, though the volume of trade being handled is probably greater than the reports would indicate. That is to say, while not a great many prospects are coming into the market, giving the impression of stagnation, business is being closed up right along, and the sum total is far from unsatisfactory. Boiler manufacturers appear to be hardest hit by present conditions, reports from leading houses indicating that the number of new jobs being offered is remarkably small. Labor troubles in some of the cities of this territory have tied up building operations, and are another factor which is hurting the trade. Electrical equipment is in fair demand. Some good sales of machine tools and woodworking equipment are being reported.

The Ohio Valley Handle Fitting Machine Company, Louisville, has been incorporated with $25,000 capital stock by Lorenzo Johnson, Oscar Hauenstein and Henry Wuest. The machine is to be made for the present by the Wuest Brothers Machinery Company.

The Charles D. Williams Broom Company, Louisville, is planning to increase the capacity of its plant. The machinery is motor-driven. It may be late in the summer before the changes are made.

The Cottonseed Products Company, Louisville, is to install at once a horizontal boiler and to make other improvements. H. M. Strozier is superintendent.

B. F. Meek & Sons, Louisville, fishing-reel manufacturers, have made arrangements for increasing the capacity of their factory. Some of the machinery being bought is imported.

The Sampson Engineering Company, Louisville, recently incorporated, plans to establish a plant in the Snead Building for the manufacture of electric self-starters for automobiles and other motor specialties. Details of the machinery requirements are now being worked out. S. F. Castleman, is in charge.

The Anglo-American Tar Products Company, which is associated with the American Creosoting Company, Columbia Building, Louisville, reports that it will soon establish three plants, for which plans are now being drawn. The equipment will be purchased through the Louisville office.

The Kentucky Wagon Mfg. Company, Louisville, is planning improvements in its factory. Details will be ready about June 1. R. V. Board is president.

The Tu-Way Headlight Company, Louisville, has been incorporated with $20,000 capital stock to manufacture an automobile specialty. It is having the device manufactured by contract at present, but expects to establish a plant later. John Zimmerman, R. L. Carter and G. H. Boone are the incorporators.

The Sulphur Springs Lumber Company, Whitesburg, Ky., will install several sawmills. Stave operations will also be started.

The Central Coal & Iron Company, Central City, Ky., is beginning the construction of a coal tipple for which conveying and other equipment will be required.

The Hazard Town Coal Company, Hazard, Ky., is equipping a 1000-ton mining plant. The equipment will be electrically operated. The company will install its own power plant. W. M. Jones is president.

A band mill of 25,000 ft. daily capacity and several smaller mills will be equipped at Colson, Ky., by John Litts, Coeburn, Va.

George E. Tomlinson, Winchester, Ky., will equip an addition for the manufacture of vehicle rims and is in the market for a 100-kw. generator, a high-pressure boiler, an engine and other power equipment. Motors and wood-working machinery will also be needed.

The town of Sebree, Ky., which has voted a bond issue for the purpose of building a water system, will be ready to take bids about June 15. C. H. Ramsey is mayor.

Bids will be opened June 1 by the municipality of Halls, Tenn., for the equipment of an electric light plant. Engine, generators, switchboard and other equipment will be required. R. C. Huston, Memphis, Tenn., is consulting engineer.

W. N. Moss., Leitchfield, Ky., is engineer for the electric light plant to be installed there by the W. T. McCaskey Company, of Lansing, Mich., replacing the plant which was burned. The new plant will have a capacity of 75 hp. The cost of the building and equipment will be $10,000.

The Anglo-American Mill Company, Owensboro, Ky., which makes a midget flour mill, and which recently built an addition to its factory, is now contemplating further extensions. L. Freeman Little is president.

The Adams & Hampton Lumber Company, Johnson City, Tenn., is to establish a sawmill of 15,000 ft. daily capacity near Coalfield, Tenn.

The Tasso Milling Company, Tasso, Tenn., is to install additional equipment. Transmission and special machinery are the chief requirements.

The Telford Slate Mining & Mfg. Company, Telford, Tenn., J. L. Humphrey, manager, is in the market for planers and other equipment for manufacturing commercial slate.

The Dixie Portland Cement Company, Sequatchie, Tenn., is erecting additional storage bins which will have a capacity of 46,000 bbl. Motor-driven conveying equipment will likely be installed.

Birmingham

BIRMINGHAM, ALA., May 25, 1914.

Some betterment in general lines and a steady demand for machinery and appliances for oil mills, ice factories and small manufacturing plants of various kinds are the first indications of an improvement in the Southern machinery market.

The Southern Gas Company, Birmingham, has been incorporated with a capital stock of $300,000 by C. H. Scott, W. H. Harrison, Jr., Louis Pizitz, J. M. Corr, and others. It will build a number of gas plants in the South.

Crawford Johnson, Birmingham, has bought the plant of the Birmingham Oil Company for $40,000. He will enlarge and operate it.

The Swamstrom Mill Company, Foley, Ala., will establish an electric power plant to supply its mill and the city.

The Atlanta Vitrified Brick Company, Atlanta, Ga., has been incorporated with a capital stock of $300,000 by J. E. Poll, Lynn, Mass., and J. N. Johnson and J. W. Tindall, Atlanta, Ga.

The Vesuvius Heater Company, Atlanta, with a capital stock of $20,000 has been incorporated by J. W. Carter, T. S. Turner, Macon, Ga., and others, to manufacture stoves.

The city of St. Petersburg, Fla., has voted an issue of $150,000 of bonds to establish a municipal lighting plant. J. B. McCrary Company, Atlanta, Ga., is the contractor.

Texas

AUSTIN, TEXAS, May 23, 1914.

The demand for cotton-ginning machinery continues good. An unusual amount of electrical installations is going on in different cities and towns. In Dallas good progress is being made in raising a fund of $100,000 to bring factories to that city.

Capt. William E. Hunt, Quartermaster Corps, United States Army, Ft. Bliss, Texas, is advertising for bids to be opened June 15 for constructing an addition to the electric lighting system of that post.

The State Board of Water Engineers has granted a permit to the Guadalupe Power Development Company, Seguin, for the construction of 14 dams across the Guadalupe River to afford water supply for operating hydroelectric plants that the company will build. There will be two or more of these plants to generate about 25,000 hp. Guy C. Simpson, San Antonio, is engineer.

The Collin County Mill & Elevator Company, McKinney, will build a flour mill. The engine and boiler equipment are called for.

The Moloney Belting Company, Chicago, will establish a plant at 1713-1715 Griffin street, Dallas, for the manufacture of leather belting.

O. G. Bowman, Hillsboro, and associates, will erect a cotton compress and warehouse to cost about $60,000.

The taxpayers of Aspermont have voted favorably on the proposition of issuing $20,000 of bonds for constructing a municipal waterworks plant and distributing system.

The Farmers' Gin Company, McKinney, will install new machinery in its cotton gin.

The city of El Paso has issued $150,000 of bonds for waterworks improvements.

The Garner Company, Houston, has been organized with a capital stock of $50,000 to construct cotton gins. The incorporators are J. C. Garner, H. Goodwin and W. H. Kirkland.

The Arkansas River Bed Oil & Gas Company, Tulsa, Okla., is obtaining the right of way across the panhandle of Texas for the proposed gas pipe line that it is to construct from Tulsa to El Paso, touching a number of intermediate towns. The proposed line will be about 600 miles long.

E. F. Wolters, Shiner, and associates, will construct a machine shop.

The Walkers Cotton Oil & Refining Company, Austin, has increased its capital stock from $150,000 to $210,000, and will make improvements to its plant.

St. Louis

ST. LOUIS, MO., May 25, 1914.

Machinery dealers report that scarcely in the history of the business in this territory has it been so quiet as at present. New enterprises are extremely few and the inquiries from this source are almost negligible. Replacement orders are equally few, there being no disposition on the part of established industries to indulge in any expense that can be avoided.

The Essaness Mfg. Company, St. Louis, has been incorporated with a capital stock of $15,000 by J. C. Streett, G. H. Shields, Jr., and William Kleissle to engage in the manufacture of mechanical devices.

The Mitchell Reversible Window Company, Kansas City, Mo., has been incorporated with a capital stock of $100,000 by A. R. Mitchell, A. B. Hollis and A. H. Lorenzen to engage in manufacturing.

The Superior Oxygen Company of Missouri, St. Louis, has been incorporated with a capital stock of $375,000 by E. W. Uhri, J. L. and W. T. Christy, J. L. Green, H. G. Lihou, and others, to manufacture oxygen and other gases.

The Farmers' Fuel Company, Kansas City, Mo., has been incorporated with a capital stock of $62,000 by M. L. Epler, John H. Bovard and D. L. James to engage in the manufacture of a patented fuel.

The Janssen-Ostertag Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $25,000 by A. Janssen, R. A. Ostertag and A. J. Stewart to engage in general manufacturing.

W. R. Jump & Son, Bakersfield, Mo., will install equipment for a 50-bbl. flour mill and will also put in overshot water-power equipment.

An addition to its Kansas City elevator, with a capacity of 1,500,000 bu., will be built by the Chicago, Burlington & Quincy Railroad. W. L. Breckenridge, Chicago, is chief engineer.

The city of Butler, Mo., has completed plans for the installation of a waterworks plant to cost $75,000. H. E. Cook, mayor, is in charge.

The Kansas City Shook & Mfg. Company, J. B. Cullom, Wilson, Ark., in charge, will add new equipment to its plant. A blow pipe equipment is wanted also. Capital is $50,000. The company will manufacture shooks and slats.

The Triangle Lumber Company's plant at Clio, Ark., is reported burned with a loss of $80,000. It will be rebuilt.

The Mazeppa Oil & Gas Company, Morris, Okla., is in the market for power plant and pumping equipment. Address T. L. Powell.

The Jacobs Vending Machine Company, Oklahoma City, Okla., has been incorporated with a capital stock of $50,000 by J. R. Jacobs, John W. Nicely and S. Howell to manufacture patented vending machines.

The city of Marlow, Okla., J. B. Rogers, clerk, will receive bids for air compressors, with motors 100-hp. engine and 65-kw. generator and allied equipment for the municipal electric plant.

The Clay County Cotton Oil Company's plant, Moss Point, Miss., is reported burned with a loss of $50,000. It will be rebuilt.

The city of Melville, La., has formally authorized the equipment of an electric light plant at a cost of $15,000. L. J. Williams, mayor, should be addressed.

The Ouachita Bottling Works, Monroe, La., has bought the Rayville Bottling Works and will install an ice plant.

The Long Pine Lumber Company, Texarkana, Ark., has acquired the mills of the Bayou Rapids Lumber Company and will remodel them, add equipment and extend operations. J. K. Wadley is treasurer.

F. L. Sanford, Zona, La., will build a band mill and install a power plant.

San Francisco

SAN FRANCISCO, CAL., May 19, 1914.

The machinery trade remains inactive, though scattering orders of some individual importance are coming out with more frequency than for some time, and dealers begin to feel a little more confidence. The small single-tool business, usually a prominent factor, is very quiet; but some quite good sales have been made, and more are in prospect. An order for 41 machine tools for the Oakland High School, comprising 24 lathes, etc., has been distributed among three machine tool firms. There is an abundance of inquiries in all lines, but in most cases orders do not follow. The crop outlook is having more effect than usual. Several manufacturers of harvesting equipment, traction engines, etc., have been extremely busy, and there is some activity at railroad shops in preparation for the crop movement. Good business has been booked in highway and quarry machinery, and some large inquiries are coming out in connection with reclamation work, oil transportation systems, etc.

The Union Tool Company, Los Angeles, is now taking figures for tools for the addition to its plant.

The shops of the Pacific Fruit Express Company, Los Angeles, will be transferred to new buildings this summer.

The Pope & Talbot Lumber Company, San Francisco, is preparing to install a large electric cantilever crane at its yard, Third and Berry streets.

The San Francisco Bottling & Cold Storage Company, San Francisco, is building a large plant at Fifteenth and Florida streets, and will put in machinery amounting to about $90,000.

The Iowa Furnace Company, Santa Ana, Cal., is making arrangements for the establishment of a factory.

The local saw shop and supply depot of the Simonds Mfg. Company, 12 Natoma street, San Francisco, was burned May 15.

The Pacific Northwest

SEATTLE, WASH., May 19, 1914.

It is reported that many mills and logging camps in Oregon and Washington are preparing to shut down, some having already done so, owing to unsatisfactory market conditions. This has not yet resulted in any marked curtailment in the demand for machinery, as some new mills are still being built; but the outlook is doubtful at best. The lumber industry looks for some relief through the opening of the Panama Canal, but it is conceded that the British Columbia mills will get the greatest benefit. Metal-working tools are quiet, and there is no real activity in equipment for general manufacturing purposes. Public work in various lines is giving rise to considerable business, and plans are under way for the expansion of railroad terminal facilities. The approach of the harvest season is causing considerable activity in implements and the like. Boat shops and shipbuilding plants are fairly busy, and there is a good demand for marine gas engines.

The Board of Public Works, Seattle, Wash., has approved of plans for the auxiliary steam plant to be built on Lake Union, as an adjunct to the present municipal light and power plant. Daniel Huntington, city architect, prepared the plans. Work will begin immediately.

Announcement has been made by B. F. Walling, Jr., Chicago, Ill., that a company has been formed for the distribution of electric power throughout southwest Washington, with headquarters at Chehalis. A large hydroelectric power plant will be built, and also an auxiliary steam plant, the two plants to cost more than $500,000.

The City Council, Tacoma, Wash., has decided to temporarily withhold action on the plans recently prepared for a $20,000 municipal cold storage plant. It is possible a larger plant than at first contemplated will be erected.

The Tidewater Logging Company, Tacoma, has increased its capitalization from $10,000 to $50,000.

A company has been organized in Tacoma, Wash., by C. D. Witte and S. G. Cook, 520 Tacoma Building, for manufacturing a heavy duty transmission motor truck. It is capitalized at $250,000 and will build a factory.

The Idaho Lumber & Milling Company, Spokane, has been formed by C. J. Colman, B. F. Edwards, John W. Fisher, incorporators, with a capital stock of $50,000.

Eugene F. Klemptner and Edward Clifford, Seattle, the latter of the firm of Clifford & Van Arsdale, are building a $25,000 creamery at Port Orchard, across the bay from Bremerton. They are receiving bids for machinery, care of Clifford & Van Arsdale, Seattle.

Fire in the plant of the Washington-Portland Cement Company, Concrete, Wash., recently entailed the loss of about $30,000. The construction of a larger and better equipped plant has been undertaken.

The mill of the Michigan-Idaho Lumber Company, Payette, Idaho, was recently entirely destroyed by fire, with considerable loss. The mill will be rebuilt at once, with an annual capacity of 30,000,000 ft.

Eastern Canada

TORONTO, ONT., May 23, 1914.

The waterworks extensions at Toronto for this season comprise the addition of a mechanical filtration plant at a cost of $1,000,000, extensions to the main pumping station at a cost of $360,000, and extensions to high level pumping station at a cost of $250,000. A duplicate waterworks plant at the eastern section is also proposed at a cost of $5,400,000.

The Dominion Chair Company, Toronto, has secured a site and will erect a factory at Niagara Falls, Ont. The plant and equipment will cost about $185,000.

H. C. Hocken, mayor, Toronto, chairman of the board of control, has announced that the date for receiving tenders for the 24,000,000-gal. centrifugal pumps and engines has been extended from May 19 to June 16.

The Solvay Process Company, Syracuse, N. Y., will erect a large plant at Amherstburg, Ont., for the manufacture of soda ash and kindred commodities. It has taken an option on hundreds of acres, part of which will be used for a manufacturing site.

The Canada Wire & Cable Company, Leaside, Ont., is erecting a factory at a cost of $1,000,000. The main part will be 500 ft. in length, three stories, while the rest of the building will be one story.

The Dominion Stove Company will erect a plant at Kingsville, Ont., to cost $12,000. J. C. Pennington, La-Belle Building, Windsor, Ont. is the architect.

Authority has been granted to the Bathurst Lumber Company, Bathurst, N. B., to put up a pulp and paper plant at a cost of $3,000,000.

The town of Beaconsfield, Que., will make extensions to its electric light plant to cost $20,000.

The box factory of the Turner Lumber & Pulp Company, Limoilou, Que., was recently destroyed by fire, with a loss estimated at $20,000. It will be rebuilt at once.

Large extensions, to cost $75,000, will be made to the electric light system of Outremont, Que., this season.

The Dorchester Electric Company, Quebec, Que., will install a 1000-hp. unit.

The town of Verdun, Que., will make extensions to its waterworks and electric light plant this summer.

Western Canada

WINNIPEG, MAN., May 22, 1914.

Machinery firms report business fair. There is really not much improvement over last month, but there are more prospects. It is expected that trade will soon show considerable betterment as there are quite a number of propositions in the industrial line under contemplation. The money situation in western Canada is easier, and that will have a beneficial effect on construction. Many municipalities are getting ready to carry out improvements. Numerous manufacturers who intended to make extensions last year, but were prevented from doing so by the general financial stringency, will make the necessary additions this season.

The Canadian Northern Railway will construct yards, round-houses and shops at Port Mann, B. C., this summer.

Ft. William, Ont., will make extensions to its electric lighting system and will erect a new sub-station in the near future to cost $75,000.

It is proposed by the city of Port Arthur, Ont., to construct a pumping station, disposal works, etc., at a total cost of $2,500,000 and to spend $550,000 for extensions to its waterworks system. These extensions include duplicate motor-driven pumps, etc.

The ratepayers of Weyburn, Sask., passed by-laws to grant $155,500 for improvements and extensions to sewers, waterworks and electric light plant. Work will be commenced at once.

The ratepayers of Moose Jaw, Sask., have passed a by-law to grant $155,000 for an electric light plant.

The Regina Red Press Brick Company has completed arrangements with the board of trade, Regina,

Sask., and will erect a red brick plant to manufacture between 50,000 and 100,000 brick per day. The plant will cost $75,000.

Whitworth Bros., Pilot Butte, Sask., will make large additions to their plant, to cost from $50,000 to $100,000. A complete new crushing and screening plant will be installed. The head office of the company is located at Regina, Sask.

The Lake of the Woods Milling Company, Ltd., Winnipeg and Montreal, has bought the flour mill of the Medicine Hat Milling Company, Ltd., Medicine Hat, Alta., and will increase its capacity, which is at present 1000 bbl. daily, to more than 2000 bbl.

The capital stock of the Medicine Hat Pump & Brass Mfg. Company, Ltd., Medicine Hat, Alta., has been increased from $50,000 to $75,000 for the purpose of enlarging the plant.

R. J. Christian, Vancouver, B. C., lumberman, is contemplating the erection of a mill at Point Edward, B. C.

M. B. King, president of the Cranbrook Lumber Company, Cranbrook, B. C., will erect a lumber mill of large capacity.

The City Council, Calgary, Alta., has decided to make extensions to the waterworks at a cost of about $250,000.

Government Purchases

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until June 16, schedule 6831, one motor-driven non-reversing 40-in. x 60-in. suction dry-room tumbler for Annapolis; schedule 6839, class 1, one 60-cycle three-phase 2200-volt, 110-hp., type A induction motor for Brooklyn; schedule 6818, one vertical sprue cutting machine; schedule 6834, one motor-driven 24-in. combination bar and chucking lathe, one motor-driven 30-in. rapid reduction screw-cutting lathe, two motor-driven combined horizontal and vertical milling machines, all for Norfolk; schedule 6833, one punching and forming press for Portsmouth; until June 23, schedule 6813, one motor-driven combination saw and dado machine; schedule 6824, one motor-driven hydraulic test pump, 10 pneumatic chipping hammers, four portable automatic grinders and buffers, two motor-driven portable bench drills and belt driven bench saws and band saws and spare saws; schedule 6825, miscellaneous claw type hydraulic jacks, all for Mare Island.

The general purchasing officer of the Panama Canal will open bids June 11, under Canal circular 854, for furnishing four steam-driven horizontal duplex non-condensing double-acting pumps for oil-handling plants, the capacity of the pumps to be 1200 bbl. per hour against a head of 150 lb. per sq. in., and 400 bbl. per hour against a head of 250 lb. per sq. in. Proposals will also be asked for a 225-gal. per min. centrifugal pump unit, complete with motor, etc.

Bids will be received by the chief of the Bureau of Yards and Docks, Navy Department, Washington, until 11 a. m., June 13, for one 20-ton locomotive crane for Boston.

The lighthouse inspector, Portland, Ore., will receive bids May 15 for one 36 x 144-in. boiler, one steam engine, one steam pump, etc., for the New Dungeness Light station, Wash.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, May 19, for furnishing material and supplies for the navy yards as follows:

Schedule 6638, Steam Engineering.

Class 2, Mare Island—One motor-driven screw-cutting back-geared engine lathe and spare parts—Bid 39, $1159; 41, $1326; 55, $1364.13 and $1154.99; 59, units; 76, $1160, $1055, $1232 and $1084; 79, $1214 and $1104; 87, $1423, $1135 and $1093; 100, $575; 103, $1290; 113, $1381; 129, $1378.50, $1225.75, $1215 and $1065.50.

Alternate—Same, f.o.b. works—Bid 39, $1109; 41, $1226; 55, $1302.13 and $1067.39; 59, units; 76, $1114, $1005, $1175 and $1027; 79, $1148 and $1038; 84, $1059.83; 87, 1351, $1065 and $1023; 103, $1164; 129, $1506.55, $1303, $1151, $1335, $1155 and $1009.

Class 3, Mare Island—One motor-driven tool-room column shaper and spare parts. Bid 39, $1053; 55, $754 and $1039.15; 59, $780 and $738; 76, $890, $810, $781 and $708; 79, $812 and $702; 87, $691, $645 and $615; 94, $887; 103, $995; 113, $887; 129, $953.60; $800, $872 and $777; 129, $1074, $958 and $863.

Alternate—Same, f.o.b. works—Bid 39, $993; 55, $704 and $983.15; 59, $710.80 and $668.80; 76, $830, $750, $720 and $647; 79, $747 and $637; 84, $678.30; 87, $646, $600 and $570; 94, $1052; 103, $921; 129, $899, $752, $806 and $715; 129, $1006, $892 and $801.

Class 4, Mare Island—One motor-driven upright drill press—Bid 55, $861.65; 59, units; 76, $520, $405, $372, $530, $477 and $444; 79, $647 and $559; 87, $246, $270, $366 $376, $400 and $496; 103, $550; 129, $674 and $583.

Alternate—Same, f.o.b. works—Bid 55, $811.65; 59, units; 76, $505, $300, $357, $500 and $414; 79, $600 and $512; 84, $893.30 and $780; 87, $230, $255, $351, $352, $376 and $472; 103, $499; 129, $632 and $543.

Class 5, Mare Island—One motor-driven double emery grinder and spare parts—Bid 30, $247.25; 32, $159; 39, $202; 41, $218.50 and $198.50; 59, $180 and $181; 76, $185; 87, $215; 103, $338.

Alternate—Same, f.o.b. works—Bid 26, $345.05; 39, $183.50; 41, $194.50 and $174.50; 59, $164 and $167.25; 87, $200; 103, $316; 120, $225.

Schedule 6689, Yards and Docks.

Class 11, Portsmouth—Two 20-hp. boilers—Bid 6, $1200, $648, $975 and $815; 47, $865.

Schedule 6690, Construction and Repair.

Class 21, Philadelphia—Four centrifugal pumps—Bid 2, $2995.52 and $2851.48; 12, $1300; 14, $2860 and $2650; 16, $3360, $2980, $2820 and $3400; 23, $3504.70; 24, $2180 and $2320; 26, $2518.80; 33, $2970; 34, $3160.20 and $2859.10; 42, units; 59, units; 68, $2729.14; 88, units; 95, $2700; 98, $3395.82; 105, $2989.36; 122, units.

Schedule 6691, Construction and Repair.

Class 22, Brooklyn—One motor-driven 36-in. band-sawing machine—Bid 7, $436.96 and $345.95; 12, $330, $425, and $455; 17, $396.50; 20, $385; 45, $557.95 and $532.95; 59, $351; 76, $399 and $341; 85, $516, $423 and $365.

Alternate—Same, Charlestown, Mass.—Bid 7, $437.53 and $346.46; 12, $335, $430 and $460; 17, $398.16; 20, $385; 45, $557.95 and $532.95; 59, $351; 76, $399 and $341; 85, $516, $423 and $365.

Class 23, one motor-driven revolving oilstone and grinder—Bid 7, $248.80 and $154.51; 12, $150; 59, $221.50 and $143.50; 76, $315 and $285; 85, $185, $175, $245 and $230.

Alternate—Same, Boston—Bid 7, $249.55 and $155.60; 12, $155; 59, $223 and $145; 76, $315 and $285; 85, $185, $175, $245 and $230.

Class 24, New York—One motor-driven vertical mortiser—Bid 7, $534.35 and $418.35; 20, $400 and $440; 45, $435.06; 59, $458.50 and $351.50; 76, $362 and $323; 85, $332 and $375.

Alternate—Same, Boston—Bid 7, $534.98 and $418.98; 20, $400 and $440; 45, $435.06; 59, $461.50 and $354.50; 76, $362 and $323.

Schedule 6714, Steam and Engineering.

Class 111, Norfolk—Feed pumps, fire pumps, oil pumps, circulation pump, etc.—Bid 16, $4322 and $4622; 35, $2105.50, part; 48, $2168.60; 114, $150, part; 126, $5688.75 and $6532.95; 127, $3140, part.

The names of the bidders and the numbers under which they appear in the above list, are as follows:

2. Alberger Pump & Condenser Company
6. American Iron Works
7. American Woodworking Machinery Company.
12. F. A. Branda & Co.
14. Blackall & Baldwin Company
16. Blake & Knowles Steam Pump Works
17. Berlin Machine Works
20. Bentel & Margedant Company
23. Camden Iron Works
24. A. S. Cameron Steam Pump Works
26. W. T. Cheyney
30. James Clark, Jr., Electric Company
32. Cincinnati Electrical Tool Company
33. D'Olier Centrifugal Pump & Machinery Company
34. DeLaval Steam Turbine Company
35. M. T. Davidson Company
39. Eccles & Smith Company
41. Frevert Machinery Company
42. Fairbanks, Morse & Co.
45. J. A. Fay & Egan Company
47. Gas Engine & Power Company & Charles L. Seabury Sons & Co.
48. Gardner Governor Company
55. Harron, Rickard & McCone.
59. Kemp Machinery Company
68. Morris Machine Works.
76. Manning, Maxwell & Moore
79. Niles-Bement-Pond Company
84. D. Nast Machinery Company
85. Oliver Machinery Company
87. Pacific Tool & Supply Company
88. Providence Engineering Works
94. Potter & Johnston Machine Company.
95. William E. Quinby (Inc.)
98. Rumsey & Co.
100. Rahn-Larmon Company.
103. Joseph T. Ryerson & Son
105. J. J. Shannon & Co.
113. Springfield Machine Tool Company
114. Scranton Pump Company
120. United States Electrical Tool Company
122. Van Wie Pump Company
126. G. & J. Weir (Ltd.)
127. Warren Steam Pump Company
129. Fred Ward & Son

The following bids were received May 15 on class 1 of Panama circular 845, postponed to this date from the regular opening:

Bid 144, Alberger Pump and Condenser Company, $6684; 143 days.
Bid 145, Henry R. Worthington, $6018.40; 161 days.

Railroad Commission Economy and Efficiency

The Bache Review, published by J. S. Bache & Co., New York City, in its issue of May 23, has the following to say regarding the practice of the Interstate Commerce Commission:

We are told that last fall, when the Eastern railroads made application to the Interstate Commerce Commission to advance rates 5 per cent., they were instructed by the commission to file tariffs on a 5 per cent. increase basis, and that the commission would then suspend these and investigate. The preparation of tariffs is a very costly operation, and from the actual figures of one of the smaller roads this 5 per cent. tariff shows a cost of about $25 per mile of road. In the Eastern district about 100,000 miles of road are operated, so that the cost to these roads last fall for the preliminary operation of filing this tariff was in the neighborhood of $2,500,000. These tariffs were filed and cartloads of documents pertaining thereto sent to the commission. It is fair to presume that it has been a physical impossibility for this overworked body of men to go through this. Now, if the commission does not allow an increase of 5 per cent. and whatever advance is made is on another basis from this, the $2,500,000 spent by the roads in filing tariffs last fall will count as a total loss and new schedules will have to be prepared at an equal expense for the new percentage which the commission may allow. For a body of men who are constantly preaching economy, this discouraging waste of railroad resources is not, certainly, to be commended.

Trade Publications

Graphite Lubricators.—F and F Graphite Lubricator Company, Mt. Airy, Philadelphia, Pa. Folder. Mentions a graphite lubricator, which is designed for cylinder lubrication. The device is attached to the indicator cock or any convenient connection to the cylinder, and is claimed to feed flake graphite automatically and uniformly to all parts of the cylinder, where there is steam or air pressure. A decrease of 50 per cent. in the amount of oil required for cylinder lubrication is claimed for the device.

Gasoline and Air Tanks.—William B. Scaife & Sons Company, Pittsburgh, Pa. Catalogue. Describes a line of gasoline storage and welded gasoline tanks and air tanks for garages.

Portable Electric Tools—Standard Electric Tool Company, Cincinnati, Ohio. Two bulletins. The first, G-7 superseding G-6, points out the advantages of using a ball bearing portable electric grinding machine which is made in parallel, universal, aerial, tool post and bench types, for use on either direct or alternating current, or on either interchangeably when equipped with a universal motor. A general description of the line is given, with brief mention of the special features of each particular tool. In the second bulletin, U-9 superseding U-8, illustrations and descriptive matter explain the operation of a line of portable electric drilling machines for use on direct-current and single-phase alternating-current circuits, where the frequency of the latter does not exceed 60 cycles interchangeably. These machines are built for drilling holes from ¼ to 1¼ in. in diameter in steel and ⅝ to 2 in. in wood. A condensed table of specifications showing the equipment furnished with the various sizes is included.

All-Metal Seal.—Metropolitan Engineering Company, 30 East Forty-second street, New York City. Leaflet. Embodies illustrations and a brief description of an all-metal seal, which consists of a disk and a hasp. When the hasp, which is of a special shape, is pushed into the disk, it catches in the interior and cannot be opened except by destroying the seal. A small trademark or number may be stamped on the hasp for identification. While the seal was primarily designed to protect electric meters and service cut-out boxes, it can also be used for sealing instruments, registers, freight cars, etc.

Industrial Railways, Cars and Accessories.—Easton Car & Construction Company, Easton, Pa. Folder. Illustrates a number of different types of cars for use on industrial railways, as well as tracks and accessories. The cars shown cover practically all styles that are built of either wood or steel, or steel and wood combined.

Rubber Covered Wires and Cables.—Hazard Mfg. Company, Wilkes-Barre, Pa. Price list No. 54. Pertains to a line of rubber covered wires and cables for light, power, telephone, telegraph and railroad signal work. The various sizes of wire that are used are given, and mention is also made of a number of special cords and cables that can be supplied. A table showing additions that have to be made to the prices quoted to take care of freight charges to different sections of the country is included.

Open-Hearth Steels.—Carbon Steel Company, Pittsburgh, Pa. Catalogue. Gives a complete list and analyses of a line of open-hearth steels and the special uses for which they are adapted. Tables showing the sizes of universal mill plates made by this company from acid or basic open-hearth steel are included. Mention is also made of the other lines of the company, which include hydraulic and hammer forgings and bar mill products.

Rope Driving.—Mesta Machine Company, Pittsburgh, Pa. Bulletin O. Calls attention to the advantages of rope driving, the chief of which is a high efficiency ranging from 87 to 97 per cent., and contains information on the length of life of Manila rope. The company's drives are of the multiple system, in which each rope is a separate unit. A number of views showing rope drives installed in sheet, skelp and tin plate mills are included, together with a diagram of a typical mill layout, illustrating the way in which power is transmitted from one engine to nine stands of rolls.

Gear Planing Machine.—Gleason Works, Rochester, N. Y. Catalogue. Refers briefly to the line of bevel gear planing machines of this company, which include both the generating and the forming styles. Illustrations of the several different sizes are given, together with condensed specification tables. Mention is also made of a bevel gear planing machine for handling gears up to a maximum pitch diameter of 16 ft. and gear centering and testing machines. Drawings of the various mandrels that can be supplied are included.

Woodworking Machinery.—Crescent Machinery Company, Leetonia, Ohio. Catalogue. Gives general description and specifications for a line of woodworking machinery of all kinds. For the most part two pages are devoted to each machine, an engraving appearing on one page, with a very comprehensive description on the facing one. One of the special machines described is a universal woodworking machine, which is available in 12 combinations.

Plating and Industrial Brushes.—Munning-Loeb Co., Matawan, N. J. Bulletin No. 500. Contains information on the manufacture of brushes from the making of the block and the selection and origin of the stock to the final finish. The operating characteristics of the quality of material used are touched upon briefly. Views are presented of brushes of different materials for use in polishing lathes, cleaning castings, pattern dusting, flowing and lacquering, etc. Mention is also made of the various other products of the company and the publications that have been issued describing them.

Rust Prevention.—American Rust Proof Company, Inc., 30 Church street, New York City. Booklet. Treats of Vatudrip which is a liquid rust preventative that can be used either as a drip or applied with a brush to metallic surfaces or articles which it is desired to protect against the action of corrosion. One of the special features about the preventative is that it penetrates the pores of the metal and will set, but will not harden, crack or peel off.

Pumps and Feed Water Heaters.—Platt Iron Works Company, Dayton, Ohio. Pamphlets Nos. 655, 657, 660 and 679. The first illustrates and describes a line of steam pumps for all classes of service, the text matter forming only a small portion of the pamphlet. The second is composed almost entirely of illustrations of triplex pumps, ranging in capacity from 3 to 3000 gal. per min. These are arranged for both portable and stationary units for belt and direct-connected electric motor or gas engine drive. The third shows the different types of Stillwell feed water heaters which are arranged with float control and water seal overflows and are also built in vertical and horizontal patterns. The last pamphlet is quite general in its character and calls attention to a few Platt products, which, in addition to those already mentioned, include pumping engines, air compressors, surface and jet condensers and water wheels.

Files.—American Swiss File & Tool Company, 24 John street, New York City. Circular. Refers to a new style which removes metal in curly shavings instead of the ordinary granular filings. The cut consists of diagonal rows of cutting edges which give the file its wavy appearance and suggests the name Wavecut. This file is made a 14-in. length, with three cuts. Mention is also made of a 14-in. size that can be supplied in all the regular cuts.

Electric Drilling Machines.—Independent Pneumatic Tool Company, Thor Building, Chicago, Ill. Circular E-1. Mentions the various sizes of universal electric drilling machines which can be supplied and gives brief specifications. The features of these drills, which are ball bearing throughout and have a readily removable pinion on the armature shaft, are briefly touched upon.